



2022 National Capital Region Water Resources Virtual Symposium

Data Science Applications in Water Management

Friday, April 8, 2022
8:30 a.m. – 6:00 p.m.

University of the District of Columbia (UDC)
UDC Student Center – Level 1
4200 Connecticut Ave., NW, Washington DC 20008

Introduction

This one-day symposium brings together experts from governmental agencies, academia, the private sector, and non-profits to present and discuss innovations in water research, technology, policy and management to respect and reflect the value of water in the National Capital Region, as well as nationally and internationally. We hope that you will make the most of the opportunity to meet other water resources professionals across the region.

The National Capital Region, encompassing the District of Columbia, and parts of Maryland, Virginia and West Virginia, has unique and challenging opportunities for sustainable & resilient management of water resources and infrastructure. The region makes up a large portion of the watershed for the Chesapeake Bay, the largest estuary in the U.S; contains rivers which provide for the water needs of nearly six million people; and hosts many organizations and entities that consider water resources as their primary focus. The role of the AWRA-National Capital Region Section is to focus water resources professionals on water resources issues in the National Capital Region.

The theme of the 2022 Water Resources Symposium is Data Science Applications in Water Management, which is a critical and futuristic topic that will be discussed by featured speakers in the plenary session.

Featured Speakers



Stacey Archfield



Shawn Komlos



Mathew Mampara



Sudhir Shrestha



Jason Davison



Michelle Wyman

Keynote Speaker

Stacey Archfield, Ph.D. is a Research Hydrologist with the USGS Water Resources Mission Area in Reston, Virginia. Dr. Archfield leads both national drought research and the development of an integrated, hydroterrestrial modeling capacity. Her personal research is focused on understanding hydrologic change for water resources applications. Dr. Archfield is a Co-Executive Editor of the Hydrological Sciences Journal, an Editor of Hydrology and Earth Systems Science, and an Associate Editor of Water Resources Research. Dr. Archfield holds a M.S. in Geosystems from the Massachusetts Institute of Technology, a Ph.D. in Civil and Environmental Engineering from Tufts University, and a B.S. in Geology from Northeastern University.

Panelists

Shawn Komlos, a Physical Scientist, serves as Director of the U.S. Army Corps of Engineers (Corps) Navigation and Civil Works Decision Support Center (NDC), within the Corps' Institute for Water Resources (CEIWR) and serves as steward of authoritative waterborne commerce, navigation infrastructure performance, and a variety of other data that are managed to support the Corps' portfolio of Civil Works missions and associated water resources planning, management, and investment contexts.

Mathew Mampara, P.E., Vice President at Dewberry. Mr. Mampara's specialties lie in the areas of engineering analyses focused on extreme value theory and geospatial distribution of extreme events in support of natural hazard risk mitigation and climate change adaptation pursuits and projects. He has leveraged his expertise in the areas of flood hazard and geospatial analyses to help communities understand risks posed by climate change. While his focus has been primarily in water resources management and water resources infrastructure, he has executed projects in broader natural hazards risk and infrastructure vulnerability. He also has extensive experience in the area of geospatial analyses and tool development- using both open source and proprietary platforms.



Sudhir Shrestha, Physical Scientist at NOAA, is serving as the Technical Director for the Office of Water Prediction (OWP) Web/Dissemination project. In this role, he provides key support and leadership for the development and deployment of the Office of Water Prediction web presence, including solutions on web and geospatial dissemination services in Cloud and on-premise infrastructure to support the National Weather Service Water Resources Program. He also provides key technical support in developing system architecture design for the Hydrologic Visualization and Inundation Services (HydroVIS) project involving cloud deployment of National Water Model (NWM) and River Forecast Center (RFC) forecast visualizations, including inundation geospatial mapping services. As a part of the web/dissemination effort, he represents, collaborates, and creates strong stakeholder relationships with national, regional, and local partners in planning, deployment, and maintenance of national data dissemination and services. As an earth scientist, he strives to make geospatial earth science data easy to use with added value to large users with emphasis on the science community.

Jason Davison, Ph.D. is an Assistant Professor in the Department of Civil and Environmental Engineering at The Catholic University of America. Previously, he was a Post-Doctoral Scientist at Aquanty Inc., where he researched Canada's water resources and the impact of global climate change. Jason received his PhD in Earth and Environmental Sciences from the University of Waterloo in 2017, and his research focused on integrated atmosphere, surface, and subsurface water flow models. He received his M.S. in Environmental Fluid Mechanics and Hydrology from Stanford University and his B.S. in Civil and Environmental Engineering from the Georgia Institute of Technology. Jason's research interests include water cycle modeling, environmental policy, continental scale hydrology, and climate change.

Luncheon Speaker

Michelle Wyman serves as the Executive Director of the Global Council for Science and the Environment, an international nonprofit organization that spans the boundaries between science, decision-making, and the environment. She has worked on clean energy, climate, and environmental policy with all levels of government for over two decades, implementing strategic and tactical solutions. Before joining GCSE, she served as the Director of Intergovernmental Affairs at the U.S. Department of Energy. She led the Governors' Accord for a Clean Energy Future, Applied Solutions-Local Governments Building a Clean Economy, and ICLEI USA, nonprofits that engage directly with state and local governments. She serves in a variety of advisory roles with domestic and international organizations to increase the recognition of and reliance on science in service to the environment and society.



**April 8 NCR Water Symposium Program
 UDC Student Center**

8:00 a.m.	~~ REGISTRATION ~~	Ballroom
8:45 a.m.	<p style="text-align: center;">Opening & Welcome</p> <ul style="list-style-type: none"> • Tolessa Deksissa, AWRA-NCR Section President Director, Water Resources Research Institute & Professional Science Master’s Water Resource Management Program, University of the District of Columbia • Dwane Jones, Dean, College of Agriculture, Urban Sustainability & Environmental Sciences (CAUSES), University of the District of Columbia • Tamim Younos, Symposium Chair & Vice President AWRA-NCR Section, Fellow Member AWRA; Founder & President, Green Water-Infrastructure Academy 	Ballroom
9:15 a.m.	<p style="text-align: center;">Keynote</p> <p>Stacey Archfield, Ph.D., Research Hydrologist with the USGS Water Resources Mission Area Introduction by Seth Lawler, AWRA-NCR Section Past President</p>	Ballroom
10:00 a.m. 10:30 a.m.	<p>~~ Break ~~</p> <p>Please visit posters on display</p>	Ballroom



10:30 a.m.	<p align="center">Symposium Theme & Invited Panel Data Science Applications in Water Management</p> <p>Moderator: Jason Davison, Ph.D., Assistant Professor, Department of Civil and Environmental Engineering, The Catholic University of America.</p> <p>Panelists: Shawn Komlos, Physical Scientist, U.S. Army Corps Institute for Water Resources Mathew Mampara, Vice President, Dewberry Sudhir Raj Shrestha, Physical Scientist at NOAA</p>	Ballroom
11:50 a.m.		
Noon	<p>Luncheon Speaker: Michelle Wyman, Executive Director of the Global Council for Science and the Environment Introduction by Keara Moore, AWRA-NCR Section President-Elect Lunch (provided)</p>	Ballroom

Concurrent Sessions at a Glance

1:00 p.m. – 1:30 p.m.	Poster Presentations Interactive Session	Ballroom
1:30 – 3:00 p.m.	<p>Session 1: Increasing the Resilience of Water Infrastructure to Climate Change Moderator: Jason Giovannettone, PhD, PE</p> <p>Session 2: Data Management Systems & Emerging Technologies Moderator: Leila Farhadi, PhD</p>	Ballroom
	Tower Room	
3:00 p.m. – 3:30 p.m.	Coffee Break & Networking	Ballroom
3:30 p.m. – 4:45 p.m.	<p>Session 3: Advances in Stormwater & Flood Management Research Moderator: María Nariné Torres Cajiao, PhD</p> <p>Session 4: Advances in Water Infrastructure Research & Technology Moderator: Mathini Sreetharan, PhD, PE</p>	Ballroom
	Tower Room	
5:00 p.m.- 6:00 p.m.	<p>NCR Water Symposium 10th Anniversary Celebration – Cocktail Party Poster Award Presentations</p>	Ballroom



Concurrent Sessions
1:30 p.m. – 3:00 p.m.

Session 1 – Ballroom	Session 2 – Tower Conference Room 101
<p>Increasing the Resilience of Water Infrastructure to Climate Change</p> <p>Moderator: Jason Giovannettone, Director, Climate and Sustainability for the Sisters of Mercy of the Americas</p> <p>A Systematic Review of Municipal Smart Water for Climate Adaptation and Mitigation. Allison Lassiter* and Nicole Leonard, University of Pennsylvania Weitzman School of Design, Philadelphia, Pennsylvania. Email: alass@design.upenn.edu</p> <p>Building Resilience and Adapting to Climate Change Impacts for Drinking Water and Wastewater Utilities. Curt Baranowski¹, Steve Fries¹ Ph.D., Klara Zimmerman², Wesley Wiggins² ¹U.S. EPA, ²ORISE Fellow at U.S. EPA. Email: Baranowski.Curt@epa.gov, Wiggins.Wesley@epa.gov</p> <p>The US Municipal Debt Market as the Vehicle for Financing Climate Adaptation and Water Infrastructure. Evan Kodra, Ph.D., Sr. Director of Climate and ESG at InterContinental Exchange Data Services. Email: evan.kodra@gmail.com</p> <p>Developing Climate-Resilient Codes and Standards: Approach and Implications. Dan Walker, Ph.D, Associate Director, University of Maryland Center for Technology and Systems Management, College Park, and Senior Geologist, EA Engineering, Science, and Technology, Inc. [PBC]); Bilal M. Ayyub, PhD, PE, Professor and Director, University of Maryland Center for Technology and Systems Management, College Park. Email: dwalker8@umd.edu</p>	<p>Data Management Systems & Emerging Technologies</p> <p>Moderator: Leila Farhadi, Associate Professor, Civil and Environmental Engineering Dept., George Washington University</p> <p>Data and Machine Learning Operations: Architecture Design for Estuarine Water Quality. Grace Kim, Kate Dowdy, Wilson Cheung, Jon Kislin, Danny Kaufman. Data scientists at Booz Allen Hamilton. Email: Kim_grace2@bah.com</p> <p>Robust Water Pollution Prediction Using Long Short-Term Memory (LSTM). Juan F. Ramirez Rochac¹, Nian Zhang², Tolessa Deksissa³ ¹Depart of Computer Science and Information Technology, ²Depart. of Electrical and Computer Engineering, ³Water Resources Research Institute (WRII), University of the District of Columbia, Washington, D.C. Email: jrochac@udc.edu</p> <p>A Reduced-Adjoint Variational Data Assimilation for Estimating Soil Moisture Profile and effective Soil Hydraulic Parameters using HYDRUS 1D model. Parisa Heidary¹, Leila Farhadi², Muhammad Umer Altaf³ ^{1,2}George Washington University, Washington, DC; ³Division of Earth Sciences, King Abdullah University of Science and Technology, Saudi Arabia. Email: parisaheidary@gwu.edu</p> <p>Large Scale Mapping of Evapotranspiration and Recharge Fluxes Using Variational Data Assimilation Framework. Asif Mahmood¹, Leila Farhadi² ¹Graduate student, ²Associate Professor, George Washington University, Washington DC Email: asif_mahmood@email.gwu.edu</p>



Concurrent Sessions
3:30 p.m. – 4:45 p.m.

Session 3 – Ballroom	Session 4 – Tower Conference Room Ballroom 101
<p>Advances in Stormwater & Flood Management Research</p> <p>Moderator: María Nariné Torres Cajiao, Postdoctoral Researcher, RENEW Institute, University at Buffalo, NY</p> <p>Alternative TMDL Allocation Schemes using Game-Theoretic Modeling. Nathan Boyd¹, Steven A. Gabriel², Kaye Brubaker³, Matt Ries⁴ - ¹Mechanical Engineering PhD Student; ²Professor, Mechanical Engineering; ³Associate Professor, Civil and Environmental Eng. University of Maryland; ⁴DC Water, Director of Sustainability and Watershed Management. Email: nboyd1@umd.edu</p> <p>Prioritizing Stormwater Infrastructure Improvements Under a Changing Climate. Gustavo de A. Coelho¹, Celso M. Ferreira¹, Jeremy Johnston¹, James L. Kinter III², Ishrat J. Dollan¹, and Viviana Maggioni¹ Sid and Reva Dewberry Dept. of Civil, Environmental and Infrastructure Eng. George Mason University, VA, ²Center for Ocean-Land-Atmosphere Studies and Depart. of Atmospheric, Oceanic and Earth Sciences, George Mason University. Email: gcoelho2@gmu.edu</p> <p>Flood Forecast Alerting based on NOAA’s National Water Model. Jennifer McGee, PE, CFM, GISP, Senior Water Resources Engineer & Digital Skills Lead, Wood PLC. Email: jenna.mcgee@woodplc.com</p> <p>Regional Hydrological Methods for Estimation of Maximum Flood Discharges in ungauged Dry Streambeds, Gobi Region, Mongolia. Myagmarsuren Bat-Erdene, Depart. of Geography, National Univ. of Mongolia; D. Oyunbaatar, Information and Res. Inst. of Meteorology, Ulaanbaatar, Mongolia. Email: miga_b2006@yahoo.com</p>	<p>Advances in Water Infrastructure Research & Technology</p> <p>Moderator: Mathini Sreetharan, Senior Engineer, Dewberry</p> <p>An Agile and Expandable Tool for Modeling Hydraulics and Water Quality Processes in Water Systems. Arash Massoudieh, Professor, Civil and Environmental Engineering Dept., The Catholic University of America. Email: massoudieh@cua.edu</p> <p>Energy and Water Quality Management in Water Distribution Networks Considering Variable Speed Pump and Tank Drain-out Scheduling. Adell Moradi Sabzkouhi, Ph.D., Aff.M.ASCE¹, Juneseok Lee, Ph.D., P.E., M.ASCE² and Jonathan Keck, Ph.D., P.E., M.ASCE³ ¹Department of Hydraulic Engineering, ASNRUKH, Mollasani, Iran, ²Department of Civil and Environmental Engineering, Manhattan College, Riverdale, NY, Email: juneseok.lee@manhattan.edu ³Aquify, Exelon Corporation, Chicago, IL, Email: jonathan_keck@hotmail.com</p> <p>A Swiss-Army Knife Approach: Application of High-Rate Contact Stabilization at Blue Plains. Khoa Nam Ngo^{1,2}, Maryam Sabur¹, Margaret Anderson^{1,3}, Arash Massoudieh², Bernhard Wett⁴, Charles Bott⁵, Nicholas Passarelli¹, Aklile Tesfaye¹, Ryu Suzuki¹, Christine deBarbadillo¹ and Haydée De Clippeleir¹ ¹District of Columbia Water and Sewer Authority; ²Depart. of Civil and Environ. Eng. Catholic University of America, DC; ³Northwestern University, Evanston, Illinois; ⁴ARA consult GmbH, Austria, ⁵Hampton Roads Sanitation District mail: 12ngo@cua.edu</p>

Poster Displays

Ballroom

Baltimore City Irrigation Water Quality: The Current Water Use and Needs from Baltimore City Farmers and Gardeners.

Cameron Smith, M.S. Candidate; Rachel Rosenberg Goldstein, Assistant Professor; Emmie Healey, PhD Candidate; Alex Broussard, MPH Candidate; Esha Saxena, Mya Smith and Emily Speierman, Undergraduate Students; University of Maryland, School of Public Health, Maryland Institute for Applied Environmental Health; Marcus Williams, Andy Lazur and Kelsey Brooke, University of Maryland Extension.

Email: csmith51@terpmail.umd.edu

Evaluating Indicator Bacteria and Heavy Metal Presence and Concentration in Irrigation Water on Urban Farms in Baltimore City, MD.

Emily M. Healey, PhD Candidate; Rachel Rosenberg Goldstein, Assistant Professor; Cameron Smith, M.S. Candidate; Alex Broussard, MPH Candidate; Esha Saxena, Mya Smith and Emily Speierman, Undergraduate Students; University of Maryland, School of Public Health, Maryland Institute for Applied Environmental Health; Marcus Williams, Andy Lazur and Kelsey Brooke, University of Maryland Extension.

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Trends in Regional Extreme Precipitation across the Continental United States. ¹ Graduate Research Assistant, Sid and Reva Dewberry Department of Civil, Environmental and Infrastructure Engineering; ² Graduate Research Assistant, Department of Geography and Geoinformation Science, Ph. D. Candidate, Department of Civil, Infrastructure, and Environmental Engineering, ³ Associate Professor, Department of Civil, Environmental and Infrastructure Engineering; ⁴ Graduate Teaching Assistant, Department of Civil, Environmental and Infrastructure Engineering, George Mason University.

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Stormwater Quality Treatment Using Bioretention for Landscape Irrigation Use. Jacob Wynn¹, David Lowe², Sania Rose³, Sebat Tefera⁴, Tolessa Deksissa⁵ Graduate Research Assistant, ² Graduate Research Assistant, ³ Project Assistant, ⁴ Project Specialist, ⁵ Director of Water Resources Research Institute and Professional Science Master Programs College of Agriculture, Urban Sustainability, and Environmental Sciences, University of the District of Columbia.

Email: Jacob.wynn@udc.edu

Assessing Priority Pollutant in the Downstream Tributaries of the Anacostia River in Washington, DC: A case study of Polycyclic Aromatic Hydrocarbons and Trace Metals. Sania Rose¹, Sebat Tefera², and Tolessa Deksissa³

¹ Project Assistant, ² Project Specialist, and ³ Director of Water Resources Research Institute and Professional Science Master's Program, ^{1,2,3} College of Agriculture, Urban Sustainability and Environmental Sciences, UDC

Email: sania.rose@udc.edu

Evaluating the Utility of Assimilating Satellite Observations of Sea Water Levels into a Storm Surge Model.

Soelem Aafnan Bhuiyan¹, Viviana Maggioni², Celso Ferreira³, Azbina Rahman⁴, Ridwana Binte Sharif⁵, Tyler Miesse⁶



¹Graduate Teaching Assistant, Department of Civil, Environmental and Infrastructure Engineering; ²Associate Professor, Department of Civil, Environmental and Infrastructure Engineering; ³Associate Professor, Department of Civil, Environmental and Infrastructure Engineering; ⁴Postdoctoral Research Fellow, Department of Civil, Environmental and Infrastructure Engineering; ⁵Graduate Teaching Assistant, Department of Civil, Environmental and Infrastructure Engineering; ⁶Graduate Research Assistant, George Mason University
Email: sbhuiya2@gmu.edu

Assessment of Rooftop Harvested Rainwater as Affordable Potable Water Source. Teddi Ann Galligan¹ and Tolessa Deksissa²
¹Graduate Student, Professional Science Master's, and ²Director of Water Resources Research Institute, and Professional Science Master's Program, College of Agriculture, Urban Sustainability and Environmental Sciences, UDC
Email: tagalligan@gmail.com

Nationwide Tap Water Quality Analytics Using 311 Open Datasets. Corey Curran, Student Researcher; Juneseok Lee, PhD, PE, D.WRE, Associate Professor, Civil Engineering Department, Manhattan College, NY
Email: ccurran01@manhattan.edu, Juneseok.Lee@manhattan.edu

New Developments in Premise Plumbing Analytics and Modeling for Building Water Systems. Elizabeth Ta, Student Researcher; Juneseok Lee, PhD, PE, D.WRE, Associate Professor, Civil Engineering Department, Manhattan College, NY
Email: eta01@manhattan.edu, Juneseok.Lee@manhattan.edu

Water Resources of Mongolia. Myagmarsuren Bat-Erdene (Doctoral Student), S. Erdenesukh, Department of Geography School of Arts and Sciences, National University of Mongolia; D. Oyunbaatar, Hydrology Section, Information and Research Institute of Meteorology, and Hydrology and Environment, Ulaanbaatar, Mongolia.
Email: miga_b2006@yahoo.com

5:00 p.m. – 6:00 p.m.	NCR Water Symposium 10 th Anniversary Celebration – Cocktail Party Poster Award Presentations	Heritage Hall
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Registration

Please register online by Monday, April 4 for the early bird discount. Payment is accepted online by credit card or by cash/ check payment at the event.

Step 1: Go online to the link: <https://connect.clickandpledge.com/w/Form/d89a84e4-a60d-4d6c-9ddc-515785adf000>

Step 2: Fill out the registration fee section

Step 3: Fill out the contact information section

Step 4: Scroll down and click “SUBMIT” to complete the registration and payment

Registration Fees (includes lunch & coffee breaks)	Professionals		Students	
	Member or Presenter/Moderator	Non- Member	Member or Presenter	Non- Member
On-line thru April 4, 2022	\$35	\$50	\$15	\$25
On-site April 8, 2022	\$50	\$75	\$25	\$35



The American Water Resources Association National Capital Region Section Leadership
2021-2022

AWRA-NCR Section Program Planning Committee	Board of Directors
<p>Arash Barsari David Conard Tolessa Deksissa Jason Giovannettone Seth Lawler Devan Mahadevan Keara Moore David Powers Mathini Sreetharan Tamim Younos</p>	<p>President: Tolessa Deksissa, PhD Past President: Seth Lawler President-Elect: Keara Moore Vice Pres. / Program Committee Chair: David Powers Vice Pres. / Symposium Program Chair: Tamim Younos, PhD Membership Chair: Mathini Sreetharan, PhD, PE Outreach Chair: David Conard Secretary: Arash Barsari, PE Website Chair: Devan Mahadevan, PhD, PE Treasurer: Shane Putnam, PhD, PE Directors-at-Large: Jason Giovannettone, PhD, PE</p>

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