NATIONAL ACADEMIES Sciences Engineering Medicine

## Opening Remarks

**S. Jack Hu** (NAE)
*Senior Vice President for Academic Affairs and Provost, UGA Foundation Distinguished Professor*
*University of Georgia*

Dr. S. Jack Hu was appointed Senior Vice President for Academic Affairs and Provost in 2019. In this role, he oversees instruction, research, public service and outreach, and information technology at the University of Georgia. The vice presidents of these four areas, the deans of UGA's 18 schools and colleges, and the campus dean of the Augusta University/UGA Medical Partnership report to him. The Vice Provost for Academic Affairs, the Vice Provost for Diversity and Inclusion and Strategic University Initiatives, and the Vice Provost for Graduate Education and Dean of the Graduate School also report to him, as do associate provosts for academic programs, faculty affairs, global engagement, the Honors College, and the libraries.

Prior to his appointment at UGA, Hu was Vice President for Research at the University of Michigan, where he oversaw a research enterprise that generates annual expenditures exceeding $1.5 billion and spans the university's campuses in Ann Arbor, Dearborn, and Flint. As Vice President for Research, he promoted interdisciplinary research, developed and implemented research policy, provided central administrative services in support of faculty research, innovation, and economic outreach, and managed activities related to research compliance and the responsible conduct of research. He previously served as Associate Dean for Academic Affairs and Associate Dean for Research and Graduate Education in the U-M College of Engineering.

His research in manufacturing systems, assembly, and engineering statistics has been supported by more than $46 million in external funding from agencies such as the U.S. Department of Energy and the National Science Foundation, as well as corporations such as General Motors. Hu has authored or co-authored nearly 200 peer-reviewed journal articles, as well as several book chapters, government, and industrial reports. He holds eight patents, co-founded a startup company based on his research, and worked closely with several industry partners to enhance manufacturing quality and productivity.

Hu has developed and taught courses in design, manufacturing, and engineering statistics. He chaired the dissertation committees of more than 50 Ph.D. students, in addition to advising master's students and mentoring undergraduate students pursuing research projects. He was twice recognized with the Teaching Incentive Award in the U-M Department of Mechanical Engineering.

Hu is a member of the National Academy of Engineering and serves as a member of the Executive Committee of the National Academies' Transportation Research Board. He is a Fellow of the American Society of Mechanical Engineers (ASME), the Society of Manufacturing Engineers (SME), and the International Academy for Production Engineering (CIRP).

He is the recipient of several professional honors, including the ASME William T. Ennor Manufacturing Technology Award, the SME Gold Medal, and several best paper awards. In 2021, SME named him one of the 20 most influential academics in smart manufacturing.

Hu is a UGA Foundation Distinguished Professor in the School of Environmental, Civil, Agricultural, and Mechanical Engineering in the UGA College of Engineering. He earned his bachelor's degree in mechanical engineering from Tianjin University in China and his master's degree and Ph.D. in mechanical engineering from the University of Michigan.

## Project Overview

### Hussam Mahmoud

*Committee Chair, Committee on Benefits, Applications, and Opportunities of Natural Infrastructure*
*George T. Abell Professor of Infrastructure; Director, Structural Laboratory, Colorado State University*

Dr. Mahmoud is the George T. Abell Professor in Infrastructure in the Department of Civil and Environmental Engineering at Colorado State University (CSU) and is the director of the Structural Laboratory. He obtained his BSc and MSc in civil engineering from the University of Minnesota and his Ph.D. from the University of Illinois at Urbana-Champaign (UIUC). Prior to pursuing his Ph.D., he was the manager of the NEES Earthquake Laboratory at the UIUC. Prior to arriving at UIUC, he was a research scientist at Lehigh University working on assessment and repair of deteriorated infrastructure. Dr. Mahmoud's research program has three major thrusts including assessing community resilience and recovery of infrastructure and socio-economic institutions following extreme events with a focus on climate-driven hazards, quantifying building damage to extreme single and multiple hazards, and evaluating deteriorated infrastructure such as bridges and underwater systems. He has authored over 250 publications and has given more than 100 presentations including 70 invited talks at national and international conferences. He has chaired and served on numerous technical committees, including the ASCE Committees on fire protection and on Multi-hazard Mitigation. His research has received media coverage through citations and interviews in numerous venues, including Nature Climate Change, Smithsonian Magazine, the Independent, Business Insider, and CNN.

## Background Context

### Todd Bridges

*Senior Research Scientist for Environmental Science and National Lead for Engineering With Nature Program*
*U.S. Army Corps of Engineers*

Dr. Todd Bridges is the U.S Army's Senior Research Scientist for Environmental Science. His responsibilities include leading research, development and environmental initiatives for the U.S. Army and U.S. Army Corps of Engineers (USACE).

Dr. Bridges is the National Lead for USACE's Engineering With Nature initiative, which includes a network of research projects, field demonstrations, and communication activities to promote sustainable, resilient infrastructure systems.

His primary areas of research activity at the U.S. Army Engineer Research and Development Center concern 1) the science and engineering of sustainable infrastructure development, 2) the development

of risk and decision analysis methods applied to water resources infrastructure and environmental systems, and 3) the assessment and management of environmental contaminants.

Dr. Bridges also serves as the Program Manager for the USACE Dredging Operations Environmental Research (DOER) program and the Director of the Center for Contaminated Sediments and serves as Chair of the Environmental Commission in the World Association for Waterborne Transport Infrastructure (PIANC), which is headquartered in Brussels, Belgium.

**Keynote: "Big Picture Perspective: Setting the Stage"**
**Gerry Galloway** (NAE)
*Professor Emeritus, Civil and Environmental Engineering*
*University of Maryland*

Dr. Gerald (Gerry) E. Galloway, Jr. is an Emeritus Research Professor at the University of Maryland, where his focus is on disaster resilience and mitigation, sustainable infrastructure development, and water resources and energy policy and management under climate change.

He is currently a member of the Board of Directors of the Water Institute of the Gulf, the Advisory Board of the Center for Climate and Security, and the CNA Military Advisory Board. He has served as on the Maryland State Coast Smart Council and on the Louisiana governor's Advisory Commission on Coastal Protection, Restoration and Conservation. He has led or has been a member of international committees examining water resources issues in Italy, Singapore, Mexico and China.

He joined the faculty of the University of Maryland following a 38-year career in the U.S. Army, retiring as Brigadier General and Chief Academic Officer at West Point. He served for seven years as a Presidential appointee to the Mississippi River Commission, and in 1993, he a White House study of the causes of the Great Mississippi River Flood. He holds degrees from Princeton, Penn State, the Army Command and General Staff College, and the University of North Carolina. He is a member of National Academy of Engineering, the National Academy of Construction, and the National Academy of Public Administration.

**Theme 1: Applications of Natural Infrastructure – Context, Features, and Benefits**

**Keynote:**

**Mike Donahue**
*Vice President, Water Resources and Environmental Services*
*AECOM*

Dr. Mike Donahue is a Vice President with AECOM, where he leads the company's Global Coastal and Ecosystem Restoration Practice. Dr. Donahue is a founding member of the Natural Infrastructure Initiative, a consortium of companies, NGOs and universities dedicated to promoting the application of Natural Infrastructure projects in coastal and riverine protection and restoration.

**Panelists:**

**Edward Brauer**
*Senior Hydraulic Engineer, Engineering with Nature Program*
*U.S. Army Corps of Engineers, St. Louis District*

Edward Brauer is a senior hydraulic engineer in the USACE St. Louis District (MVS) and regional technical specialist in river engineering for the Mississippi Valley Division. He has 19 years of project experience, which includes navigation; environmental restoration; research on river-training structures, including physical effects and environmental impacts; sediment transport; geomorphology; field methods; and lock design on rivers within the U.S., South America, and Europe. He has developed and led classes on shallow draft navigation and river-training-structure design and construction (including EWN topics) for engineers in the U.S. and Brazil. He is a member of the USACE River Engineering Committee, the chair of the River Engineering Working Group, the secretary of the World Association for Waterborne Transport Infrastructure (PIANC) Environmental Commission, and an adjunct professor at St. Louis University.

EWN Motivation: "I enjoy working to find solutions to engineering problems that include added value for a broad set of project partners and stakeholders. I want to foster consistent application of EWN principles within the districts and subsequently with the field-level engineers, biologists, and local stakeholders to support a cultural change in how we approach problems."

**Hollie Schmidt**
*Director, Resilient + Sustainability Business Advisory*
*Jacobs*

Hollie Schmidt is Director of the Resilience + Sustainability Business Advisory. In her 26 years of practice, she has honed an integrated planning and delivery approach, with a particular focus on master planning and site selection. Serving a broad range of projects, she leads large, diverse teams of planners, architects and the full spectrum of engineers and technical experts to assist with decision-making, scenario evaluation and implementation plans. With a strong foundation in facilitation, coordination, communication, and problem solving, she has a long history of successfully leading mega, complex

projects for clients with large real estate and facilities holdings and delivering sustainable and resilient solutions.

Hollie's area of practice includes a focus on resiliency planning either as a preventative or recovery service for larger-scale clients who are experiencing vulnerabilities to natural or man-made disasters particularly as it relates to climate change. She has led inter-disciplinary teams that deliver sustainable solutions across the natural and man-made environments for multi-billion-dollar programs as well as more moderate facilities. She also supports resilient and sustainable solutions through extremely compelling business case analysis focused on life-cycle savings and non-financial benefits such as wellness, environmental and community impact and market recognition.

**Victoria (Tori) Tomiczek (Johnson)***
*Assistant Professor, Naval Architecture & Ocean Engineering*
*U.S. Naval Academy*

Tori Tomiczek is an Assistant Professor at the U.S. Naval Academy. She earned her B.S. at the University of Florida and PhD at the University of Notre Dame. She completed a post-doctoral fellowship at Oregon State University before joining the Ocean Engineering faculty at USNA in 2017. She has participated in field reconnaissance surveys evaluating damage, recovery, and the performance of near-coast structures and hardened and natural shoreline infrastructure subject to hurricane waves and storm surge. She has enjoyed working on small- and large-scale physical model experiments at USNA, OSU, and Kyoto University. She is interested in better understanding wave-induced forces on near-coast structures to inform design guidance and finding sustainable, resilient adaptation alternatives to mitigate damage during coastal hazard events.

**Moderator:**
**Paul Freedman** (NAE)
*Committee Member, Committee on Benefits, Applications, and Opportunities of Natural Infrastructure*
*Chief Executive Officer, LimnoTech*

Paul Freedman is co-founder (1975) and CEO ofLimnoTech a nationally and internationally recognized research and consultancy providing services related to water quality and resource protection. He was an early pioneer and advocate of watershed management and green infrastructure which involves using land practices to protect surface waters. He also was a pioneer in developing corporate water stewardship which typically involves the use of land practices to replenish and protect water supplies and environment. LimnoTech under his oversight has also been working with the Army Corps of Engineers supporting their program entitled Engineering with Nature. He is a member of the National Academy of Engineering, a Fellow of both the Water Environment Federation (WEF) and American Society of Civil Engineers. He is a Past President of WEF and the founding chair of their Watershed Management Committee, among many other roles. He has chaired 5 national conferences involving watershed management. He has hundreds of papers, presentations and expert workshops to his credit. He is the recipient of numerous state and national awards. He has participated in 3 NASEM NRC panels

which addressed in part land use activities to protect water quality. He has a Masters Degree in Civil Water Resource Engineering from the University of Michigan.

**Theme 2: Elements for Implementation – Physical, Ecological, Social, and Economic Considerations**

**Keynote**

**Jenniffer Santos-Hernandez**
*Research Professor, Centro de Investigaciones Sociales, College of Social Sciences and Academic Chair, Graduate Certificate in Planning for Disaster Reduction, Graduate School of Planning*
*University of Puerto Rico-Río Piedra*

Jenniffer Marie Santos-Hernández is a research professor in sociology of disasters for Centro de Investigaciones Sociales (CIS-Center for Social Research). Established in 1945, CIS is the oldest social science research center in Puerto Rico, and part of the College of Social Sciences at University of Puerto Rico-Río Piedras. Dr. Santos-Hernández currently serves as principal investigator of the project Risk Communication in Concurrent Disasters**,** and as the lead of the Helping Affected Communities Engage in Resilience (HACER) initiative.

Santos-Hernández holds a B.A. Magna Cum Laude in Sociology from the University of Puerto Rico, an M.A. and Ph.D. in Sociology from the University of Delaware, and several certifications. Santos-Hernández is an alumna of the Disaster Research Center (DRC), the oldest and one of the leading research centers in the world devoted to research in the social aspects of disasters. Her dissertation examined issues of development and policy transfers, social vulnerability to disasters, and the increasing "rationalization" of emergency management in Puerto Rico.

Dr. Santos also worked as a research associate in population dynamics, climate change, and disasters for the Climate Change Science Institute and for the Geographic Information Science and Technology Group in the Computational Sciences and Engineering Division at Oak Ridge National Laboratory. ORNL is a world-class research facility and the largest science and energy national laboratory in the U.S. Department of Energy system. At ORNL she conducted basic science research focused on climate change and population displacement scenarios in Bangladesh and the Sahel region.

Recently completed research projects include the Community Based Climate Change Adaptation Plan for the Municipality of Dorado, and the Puerto Rico Climate Change Education Program, the NSF Urban Resilience to Extremes Sustainability Research Network (NSF UREx), and the Minority Scholars from Under-Represented Groups in Engineering and the Social Sciences (SURGE) Capacity in Disasters project.

Her interests include: population dynamics, disasters, climate change adaptation, emergency management, risk communication, collective behavior, race and ethnicity, stratification, development, environmental sociology, social movements, computational social science, and geographic information science.

**Panelists:**

**Julie Beagle**
*Environmental Planning Section Chief*
*U.S Army Corps of Engineers-San Francisco District*

Julie Beagle is the Environmental Planning Section Chief for the US Army Corps of Engineers San Francisco District (SPN). She brings a focus on integrating nature-based approaches into USACE studies,

projects, and operations. She is the environmental technical lead on several Engineering with Nature pilot projects, including piloting strategic shallow water placement of dredged materials in SF Bay to support marsh and mudflat resilience to sea-level rise. Previously Julie was the Deputy Director of the Resilient Landscapes Program at the San Francisco Estuary Institute (SFEI). Her recent technical contributions include serving as lead author for the San Francisco Bay Shoreline Adaptation Atlas, a resource for employing nature-based adaptation measures along the SF Bay shoreline. Prior to her ten years at SFEI, Julie worked with land managers on the North Coast of California to reduce fine sediment runoff into salmonid streams, and contributed to watershed-scale river restoration projects. She has worked as a fluvial and estuarine geomorphologist throughout the rivers and wetlands of California for the last 15 years and has a master's degree in environmental planning from the University of California, Berkeley.

**Marccus Hendricks***
*Assistant Professor; Director at SIRJ Lab; Affiliated Research Faculty, Clark School of Engineering's Center for Disaster Resilience*
*University of Maryland*

Dr. Hendricks' primary research interests include stormwater infrastructure planning and management, social vulnerability to disaster, environmental justice, hazard mitigation, sustainable development, public health and the built environment, and participatory action research. He takes a mixed-methods approach to his research that includes both quantitative and qualitative methods such as multiple regression, cross-sectional research, spatial mapping, in-depth interviewing, participatory action research, and different forms of spatial and analytic epidemiology, among others. At the intersection of his work, he uses a combined social vulnerability to disaster and environmental justice framework, to ensure that low-income and communities of color are planned and accounted for, emphasizing participation and action, in light of everyday urban stormwater management and extreme events such as urban flooding and investigates the socio-spatial dynamics related to the inventory, condition, and distribution of critical infrastructures and public works, mainly water infrastructure (i.e. stormwater, wastewater, and drinking water) and green space, can modify risks of hazard exposure, resulting disaster impacts, public health outcomes, and opportunities for community resilience.

While at UMD, Hendricks has received two early-career awards from both the *National Academies of Science Gulf Research Program* and *The JPB Environmental Health Fellows Program* at *Harvard T. H. Chan School of Public Health*. He also participated in a congressional briefing entitled *"Addressing the Impact of Climate Change on Public Health and Natural Disasters"* on Capitol Hill in Washington, DC, and was quoted from his participation in *Scientific American*. He has also been featured in public media on the local morning show *Get Up DC* and *Grist Magazine* discussing the Ellicott City, MD floods. He is a Faculty Research Affiliate with the Clark School of Engineering's Center for Disaster Resilience, the National Center for Smart Growth Research and Education, and the Environmental Finance Center. Hendricks has worked on research projects related to infrastructure, sustainability, public health and disasters, which have been funded by the *U.S. Centers for Disease Control and Prevention*, the *National Science Foundation*, and the *Environmental Protection Agency*. He was also awarded a Tier 1 research grant from the University of Maryland's Division of Research to work on a project entitled, *Infrastructure, Urban Flooding and its Influence on Social Vulnerability and Mobility: A Place-based Study in Southeast Washington, D.C.,* one of seven selected for funding out of 33 applications.

One of his most recent projects funded by the Sustainability Fund at the University of Maryland, will install sensors to monitor stormwater characteristics on campus and provide critical data to help improve stormwater management practices. The project will provide real-time continuous flow data that can inform both short term responses and longer-term restorations to address stormwater surface runoff. His research has been published in several journals including the *Journal of the American Planning Association, Journal of Infrastructure Systems, Risk Analysis, Landscape Journal,* and *Sustainable Cities and Society*. He has complementary professional experience from his time working with the Brazos Valley Texas Council of Governments as a public safety planner and with the Texas A&M Engineering Extension at their Emergency Services Training Institute.

Hendricks is a founding fellow of the William Averette Anderson Fund (the first national interdisciplinary organization working to increase the number of underrepresented persons of color in the field of disaster research, practice, and pedagogy) and currently serves as a board member for the Fund. He holds a PhD in Urban and Regional Science and a Master of Public Health, both from Texas A&M University. He completed his undergraduate work at the University of North Texas.

**Jeff Opperman**
*Global Freshwater Lead Scientist, Global Science*
*World Wildlife Fund*

As global lead scientist for freshwater, Jeff works across the WWF network and with external partners to direct research that can strengthen conservation strategies and to integrate science into freshwater programs and projects.

Jeff came to WWF from The Nature Conservancy where he served as the director and lead scientist of the Great Rivers Partnership. His scientific and policy research has been published in journals such as *Science, BioScience* and *Ecological Applications* and he is the lead author of the book *Floodplains: processes and management for ecosystem services*, published in 2017.

Jeff strives to communicate the challenges and opportunities of protecting fresh water through op-eds, articles and blog posts in such places as Outside, National Geographic, Grist, and The Guardian, including a 10-part series featured on the New York Times website about traveling with his family down the Mekong River in southeast Asia, exploring the people and conservation issues of that region. He holds a Ph.D. in ecosystem science from the University of California, Berkeley and a B.S. in biology from Duke University.

**Moderators**:

**Hans Louis-Charles**
*Committee Member*, *Committee on Benefits, Applications, and Opportunities of Natural Infrastructure*
*Assistant Professor, Virginia Commonwealth University*

Louis-Charles is an Assistant Professor in the Homeland Security and Emergency Preparedness program at the L. Douglas Wilder School of Government and Public Affairs at Virginia Commonwealth University

(VCU). He earned his PhD in Disaster Science and Management from the University of Delaware and was a doctoral researcher at the Disaster Research Center. At VCU, Louis-Charles teaches courses in risk and vulnerability assessment, and disaster response & recovery. His research includes mix-methods studies on household disaster preparedness and evacuation behavior, as well as emergency management policy and practice. His research on ethical post-disaster fieldwork was selected for the opening plenary of the 2020 International Researcher Committee on Disasters-Researchers Meeting held in conjunction with the 45th Annual Natural Hazards Research and Applications Workshop. Louis-Charles was the Co-Pi of the National Science Foundation INCLUDES project- Minority SURGE Capacity in Disasters, which mobilized underrepresented STEM graduate scholars towards disaster recovery efforts in the U.S. Virgin Islands following the 2017 Atlantic hurricane season. He is a Founding Fellow and the current Vice President of the William A. Anderson Fund, a non-profit that mentors underrepresented doctoral students within the academic disciplines relevant to hazard mitigation and disaster risk reduction.

**Eileen Shader**,
*Committee Member*, *Committee on Benefits, Applications, and Opportunities of Natural Infrastructure*
*Director, River Restoration, American Rivers*

Eileen Shader is Director of River Restoration at American Rivers. She leads the organization's national Floodplain Program to build capacity for equitable, integrated, and nature-based floodplain management. Through this initiative she seeks reforms to local, state and federal floodplain management policies; fosters a nation-wide Community of Practice to support equitable, integrated and nature-based floodplain management; and builds institutional capacity to implement and manage floodplain restoration projects across the United States. Eileen works at the confluence of the river conservation and flood management fields to break down silos and foster integrated planning and management strategies that maximize the benefits that rivers and floodplains provide to communities. She has more than fifteen years of experience advocating for improvements to federal water resources policies to foster support for river restoration and the use of nature-based solutions. She serves as Co-Chair of the Natural and Beneficial Functions Committee, and Co-Chair of the Social Justice Task Force for the Association of State Floodplain Managers and participates in the leadership teams for numerous coalitions including the Natural Floodplain Functions Alliance and the Water Protection Network. Eileen is a Certified Floodplain Manager and has a M.A. in Natural Resources Policy from the George Washington University.

**Daily Summary:**
**Brett Wylie**
*Senior Urban Designer, Landscape Architect and Planner*
*Jacobs*

Brett is a Senior Urban Designer, Landscape Architect and Planner at Jacobs. As a Director of Landscape Architecture within Jacobs' Advance Planning Group, Brett is focused on elevating the practice's design leadership. Brett has extensive experience in all aspects of planning, urban design and landscape architecture for diverse public and private projects in the United States, Middle East, Asia Pacific, and Caribbean. With a proven record of thoughtful design and thorough implementation, his diverse project

experience includes mixed-use developments, urban regeneration strategies, environmental resiliency, corporate development strategy, community planning, hospitality/resort design and US Federal/Department of Defense.

Brett has a Bachelor of Landscape Architecture from the University of Georgia. He is a licensed landscape architect in the State of Georgia (#1022) and the State of Florida (#1672). He is a member of the Council of Landscape Architects Registration Board (CLARB) and American Society of Landscape Architects.

**Theme 3: Making Timely Progress – Needs for Descriptive Methods, Manuals, and Standards**

**Keynote:**

**Emily Corwin**
*Director of Nature-based Engineering Solutions*
*Conservation International*

Emily Corwin is the Director of Nature-based Engineering Solutions at Conservation International, a Registered Professional Civil Engineer in the State of California, and the founder of an environmental engineering firm that focuses on water resource and conservation projects. At Conservation International Emily works to create the science, solutions, partnerships, and field examples needed to bring an innovative green-gray infrastructure approach to the world's most vulnerable communities. These projects combine the conservation and restoration of critical ecosystems with the selective use of conventional engineering approaches to provide people with solutions that deliver climate change resilience and adaptation benefits. Emily studied Hydrology at the University of California Davis, Environmental Engineering at the University of California Berkeley, and currently leads a Global Green-Gray Community of Practice, with representatives from over 100 organizations and 300 individual members. She also is a member of the Natural Infrastructure Initiative and the American Society of Civil Engineers Committee on Natural and Nature-based Infrastructure Systems.

**Panelists:**

**Bruce Ellingwood*** (NAE)
*Professor and College of Engineering Eminent Scholar*
*Colorado State University*

Dr. Ellingwood is Professor and College of Engineering Eminent Scholar at Colorado State University. His professional career of five decades has included research and administrative positions at the National Bureau of Standards (now the National Institute of Standards and Technology), Johns Hopkins University, Georgia Institute of Technology and Colorado State University. His research and professional interests center on the application of probability and statistics to structural engineering, structural reliability assessment, analysis of natural and man-made hazards and risk-informed decision-making. He is internationally recognized as an authority on structural load modeling, reliability and risk analysis of engineered facilities, and as the leader in the technical development and implementation of probability based codified design standards for building structures. He is former Editor of Structural Safety, the leading international journal in that field, and serves on several other editorial boards. He has held leadership positions in ASCE and other professional organizations and is recipient of numerous awards for his research, teaching and professional service. He is a member of the U.S. National Academy of Engineering, a Distinguished Member of ASCE, a Fellow of the Structural Engineering Institute, and a Registered Professional Engineer.

**Ellen Herbert**
*Senior Scientist, Sustainability and Nature Based Solutions*
*Ducks Unlimited*

Dr. Herbert is the Ecosystem Scientist at Ducks Unlimited (DU), a nonprofit organization committed to wetland conservation across North America. Dr. Herbert works as a member of DU's National and International Science Team to evaluate the outcomes of Ducks Unlimited's conservation work across the continent through a combination of field experimentation, numerical modeling, and data synthesis with a special emphasis on flow regulation, climate mitigation and water quality improvement. Dr. Herbert is a member of the Steering Committee of the Natural Infrastructure Initiative and helps leads DU's engagement with the Mississippi River Cities and Towns Initiative to deliver natural infrastructure to mitigate hazards and provide recreational opportunities along the Mississippi River. Dr. Herbert received her B.A in Biology from Kenyon College and her Ph.D. in Environmental Science form the School of Public and Environmental Affairs at Indiana University, where she was a graduate research fellow for the National Science Foundation. Dr. Herbert completed her post-doctoral research in the Department of Physical Sciences at the Virginia Institute of Marine Science.

**Ram Mohan***
*Senior Partner, Anchor QEA, LLC and Adjunct Professor and Director, Center for Coastal & Dredging Studies*
*Texas A&M University*

Dr. Mohan is a Principal at Anchor QEA, LLC., and directs the firms' Coastal Resiliency practice. His practice focuses on ports & harbors, beneficial uses of dredge material, wetland restoration, nature-based solutions and coastal resiliency projects, and a wide range of modeling efforts to support coastal protection and infrastructure designs. He is a member of the National Academy of Sciences' (NAS) Marine Board, where he is focused on coastal resiliency as a national priority area. Dr. Mohan was part of the editorial board for the USACE ERDC Natural and Nature Based Features (NNBF) Guidance for flood risk management. Dr. Mohan has previously served on a NAS panel mandated by the U.S. Congress to review the U.S. Army Corps of Engineers (USACE) Planning and Policy Manual. In 2005, the Western Dredging Association (WEDA) named him its "Dredger of the Year". From 2013-2016, he served as the Chairman of the World Organization of Dredging Associations. In 2014, the American Society of Civil Engineers (ASCE) elected him as a Fellow.

Dr. Mohan also serves as an Adjunct Professor (Coastal Engineering) and Director, Center for Coastal & Dredging Studies at Texas A&M University. He is the founding editor for WEDA's Journal of Dredging Engineering (2000-2016) and served as the Editor-in-Chief for the Journal of Marine Environmental Engineering (2016-2021). He also served as a past member of the Board of Directors of the American Shore & Beach Association (ASBPA) and the Association of Coastal Engineers (ACE). As the author of more than 200 publications, he brings strong technical/team leadership and motivational abilities to projects. A resident of Rehoboth Beach, Delaware, Dr. Mohan continues to be active in the coastal and marine engineering fields, mostly focusing his work on practical solutions to complex challenges that exist along America's coastlines.

**Moderators:**

**Brian Bledsoe,**

*Committee Member*, *Committee on Benefits, Applications, and Opportunities of Natural Infrastructure*
*Georgia Athletic Association Distinguished Professor in Resilient Infrastructure; Founding Director, Institute for Resilient Infrastructure Systems, University of Georgia*

Brian Bledsoe is Georgia Athletic Association Distinguished Professor in Resilient Infrastructure, and founding director of the Institute for Resilient Infrastructure Systems in the College of Engineering at the University of Georgia. Brian has over 30 years of experience as a civil and environmental engineer, hydrologist, and environmental scientist in the private and public sectors. He holds degrees from Georgia Tech, North Carolina State University, and Colorado State University (Ph.D. Civil Engineering – Hydraulics). Before entering the professorate, he worked as a consulting engineer and surveyor, and for the State of North Carolina as a watershed restoration engineer. Brian's research is focused on the interface of engineering, hydrology, and ecology with emphasis on infrastructure systems, stormwater and flood management, water quality, and natural infrastructure. He received a National Science Foundation CAREER Award in 2006, served as a Fulbright Scholar in Chile in 2008, was elected a Fellow of the American Society of Civil Engineers in 2017, and is past president of the American Ecological Engineering Society.

**Oluponmile Olonilua,**

*Committee Member*, *Committee on Benefits, Applications, and Opportunities of Natural Infrastructure*
*Professor, Emergency Management, Homeland Security, and Public Administration, Texas Southern University*

Oluponmile Olonilua is a professor of emergency management, homeland security, and public administration at her alma mater, Texas Southern University, Houston, Texas. She was the first PhD graduate from the urban planning and environmental policy program in 2006. Oluponmile is an expert on hazard mitigation, disaster management, homeland security. She is well published and her publications have focused primarily on public engagement and equity issues in hazard mitigation. Some of her publications have been in top journals in the field of emergency management including but not limited to the Journal of Emergency Management, Journal of Security, Intelligence, and Resilience Education. She has won the Mary Fran Myers scholarship award of the Natural Hazards Workshop, Colorado, and has won the advisor of the year with the Network of Schools of Public Policy, Affairs and Administration.

**Theme 4: Synching with Policies – Required Efforts and Partnerships to Scale Up**

**Keynote:**

**Shana Jones**
*Planning and Environmental Services Unit Program Manager; Strategic Operations and Planning Assistance, Carl Vinson Institute of Government*
*University of Georgia*

Shana Jones, J.D., is associate public service faculty at the University of Georgia and manages the Planning & Environmental Services Unit at the Carl Vinson Institute of Government and directs the Georgia Sea Grant Law Program. Ms. Jones' experience includes developing legal and policy guidance for local governments related to environmental, land use, infrastructure, and utility-related issues. Prior to joining the University of Georgia, Ms. Jones was the Director of the Virginia Coastal Policy Clinic at William & Mary Law School. Her research focuses on the interface of coastal law and resilience planning, emphasizing infrastructure systems and nature-based infrastructure. She co-authored The Case for Grassroots Collaboration: Social Capital and Ecosystem Restoration at the Local Level and contributes annually to the law treatise, Waters and Water Rights. She is affiliated faculty with the Institute for Resilient Infrastructure Systems (IRIS) and the River Basin Center at UGA. She received her J.D. from the University of Maryland School of Law, concentrating in environmental law, serving on the editorial board of the Maryland Law Review, and graduating Order of the Coif. She clerked at the federal district and state appellate levels. She is a 2018 graduate of the Institute of Georgia Environmental Leadership.

**Panelists:**

**Dale Morris**,
*Chief Resilience Officer*
*City of Charleston*

Dale Morris is Chief Resilience Officer for the City of Charleston, SC. Morris' primary role is the integration of comprehensive water management, planning and adaptation processes into City policy, land-use, and water projects and the addition of broader resilience approaches to City operations. Morris is the City's PM for a USACE Coastal Storm Risk Management Project.
Morris previously served as Director of Strategic Partnerships at the Water Institute of the Gulf, an applied, technical research not-for-profit based in Louisiana. He directed the Water Institute's outreach to and engagement with communities, municipalities, states, and organizations outside of Louisiana and guided the Institute's Living with Water and resilience strategy work in post-Harvey Houston, the Dutch Dialogues and related work in Charleston, SC, and Virginia.
From 1994-2018, Morris served as Senior Economist at the Royal Netherlands Embassy in Washington, DC, and, beginning in 2005, Director of the Dutch Government's water management and adaptation work across the US. Morris started his career in the U.S. Air Force and was Legislative Director to two Members of Congress. Morris is co-founder of the Dutch Dialogues, a workshop process that integrates

stormwater, groundwater, tidal and surge risks with planning and engineering in targeted cities. Morris hold a B.A. from the University of Pittsburgh and an M.A. from the University of Virginia.

**Sarah Murdock***
*Director, US Climate Resilience and Water Policy*
*The Nature Conservancy*

Ms. Murdock serves as the Director of U.S. Climate Resilience and Water Policy at The Nature Conservancy. Her 30-year career has spanned work in the public, private and now nonprofit sector on environmental and energy policy. In the past 18 years working at the Conservancy, Ms. Murdock's work has focused on policy, advocacy, communications, and executing projects that inform The Nature Conservancy's climate resilience and water policy work. Currently, she manages the development and implementation of the Conservancy's climate resilience and water related policy positions. Prior to working at the Nature Conservancy, she served as a consultant working with environmental and energy clients to develop strategic solutions to government, regulatory, and community outreach challenges. Prior to being a consultant, she served on the staff of United States Senator John F. Kerry of Massachusetts concentrating on environmental and energy policy. She holds a B.A. in environmental science from Colby College and a M.A. in urban and environmental policy from Tufts University. She also completed the Sea Education Association semester of independent oceanographic research aboard 100-foot schooner. She is married, a mother to a teenage son, loves all active and inactive outdoor activities, and resides in Scituate, MA.

**Jessica Ritter**
*Senior Director of Water Resources and Coastal Policy*
*National Wildlife Federation*

Jessie Ritter is the Senior Director of Water Resources and Coastal Policy for the National Wildlife Federation. In this role, Jessie leads the development and execution of NWF's national water resources and coastal policy priorities. She oversees federal campaigns to protect clean water and wetlands and increase the resilience of communities and wildlife in the face of climate change and natural disaster events. Jessie has also worked with the U.S. Senate Commerce Committee and a number of national non-profits on federal and state policy issues ranging from fisheries management to coastal community resilience. Jessie holds a Master of Environmental Management degree from Duke University's Nicholas School, and a B.S. in Zoology from North Carolina State University.

**Moderator:**
**David Waggonner**
*Committee Member,*
Principal, Waggonner & Ball, LLC

David Waggonner is the founding principal of Waggonner & Ball, an award-winning, internationally active architecture and environment practice located in New Orleans. The firm grounds its architectural work in historic preservation with a concentration on modern institutional projects and educational

facilities. After Hurricane Katrina, David saw an opportunity for New Orleans to reinvent itself as a sustainable city that embraces its life-blood: water. He developed a process that examines history, soils, infrastructure networks and urban space, along with water, as the foundation for design, communicating the realities of the landscape to leaders and the public to inspire change. He initiated Dutch Dialogues, an exchange between Dutch professionals and American counterparts focused on water-based urban design. David subsequently led an international team to develop the Greater New Orleans Urban Water Plan, which addresses sustainable storm water management at all scales and envisions a region that embraces water to improve resiliency, quality of life, and create new economic and development opportunities. The firm's environment work is focused on the infrastructure and spatial identity of water. This important evolving methodology has been explored productively nationally and internationally. David is a graduate of Yale School of Architecture, a Fellow in the American Institute of Architects, and a recipient of the AIA Louisiana Medal of Honor.

**denotes virtual speaker*

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