National Council for
Science and the Environment

18th National Conference and Global Forum
on Science, Policy, and the Environment

THE SCIENCE, BUSINESS, AND EDUCATION OF SUSTAINABLE INFRASTRUCTURE

Building Resilience in a Changing World

January 23-25, 2018
Hyatt Regency Crystal City
Washington, D.C.

Welcome

January 23, 2018

Dear Colleagues:

Welcome to the 2018 National Conference and Global Forum on Science, Policy, and the Environment: The Science, Business, and Education of Sustainable Infrastructure: Building Resilience in a Changing World.

With the beginning of a new year comes the start of a new era at NCSE. With our expert members representing the best of the scientific, academic, research, policy, and planning communities, it is time to take on more responsibility. Through continuing and expanding partnerships with governments, academic institutions, companies, and organizations – both at home and abroad – NCSE will leverage the strengths of each of these stakeholders and lead the discussions to advance the use of science in environmental decision and policymaking.

The new, two-year theme for our annual conference will encourage and facilitate an ongoing dialogue on sustainable infrastructure throughout 2018 and 2019. Our hope is to utilize this momentum to create long-term, resilient, comprehensive solutions to the most pressing needs facing current – and future – natural, built, social, and cyber infrastructure.

We firmly believe our organization is uniquely positioned to have a vital impact on the development of high impact policies, research, education and innovations. But in order for us to achieve these forward-looking goals, we will need the support of each expert, each industry, and each institution we are lucky enough to call members. Every discipline, personality, and specialty provides an opportunity for a new perspective on how best to address the problems before us. We encourage us all to approach the next two years with an open mind – one focused on collaboration and discovery, and welcome your input and ideas to advance our shared work.

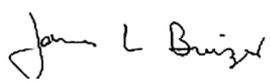
Along with the NCSE Board of Directors and staff at NCSE, we are so pleased to be working with you and serving you, and we welcome you again to the 2018 National Conference and Global Forum on Science, Policy, and the Environment.

We hope you enjoy the next few days in Washington, D.C. Thank you for your continued support, trust, and involvement in service to science and the environment.

Warmest,

Michelle Wyman
Executive Director

Mike Carvalho
Incoming Board Chair 2018-2020



Jim Buizer
Board Chair 2015-2017

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Conference Vision

We are living in a world of convergence. Boundaries are blurring between natural and built environments, humans and machines, economy and the environment. Humanity has considerable power to design the environment in which we reside. The rapid pace of science and technological change provides important opportunities for human prosperity and well-being. Infrastructure is the interconnected system of the physical, natural and social components that societies need to function.

However with progress comes considerable risk. No part of the planet is untouched by the collective impact of the more than 7 billion human inhabitants. The consequences of human impacts are threatening planetary life support systems while hundreds of millions of people live in poverty. These threats further destabilize security and society.

Investment in a broad array of next generation infrastructure can foster more sustainable communities and enhance resilience in the face of accelerating multiple socio-environmental and security threats:

- **Natural Infrastructure** provides ecological services such as clean air, water, biodiversity, food, and fiber
- **Built Infrastructure** enables transportation, housing, energy and communications services
- **Cyber infrastructure** supports the data, technology, and transmission to technological advancements and provides technical capacity
- **Social Infrastructure** enables education, research, and other human services.

The trifecta of science, business and education working together, presents an opportunity for infrastructure to be built, rebuilt, maintained or upgraded to meet standards of sustainability. Innovation in all fields of natural sciences, engineering, computing, social sciences, and education working with business and government offers great potential.

The 2018 NCSE National Conference and Global Forum on Science, Policy, and the Environment will explore how systems thinking and a sustainability framework can serve society through investment in natural, built, cyber, and social infrastructure. Policymakers, business people, scientists, and other citizens will come together to consider the opportunities for investment in infrastructure and discuss how scholarly communities, business, and government can work together to advance solutions that can enable well-being for all over multiple generations.

We will examine how design that integrates nature and technology can increase resilience in a time of rapid social, technological, and environmental change. We will discuss how research and education can be transformed to foster transdisciplinary convergence to help meet societal needs. The conference will engage people from multiple perspectives, sectors, and disciplines in a rich conversation that will expand personal perspectives, change the way we operate in our professional lives, and influence the policy and scholarly agenda moving forward.

GOALS

- Advance strategic frameworks for sustainability and resilient infrastructure.
- Catalyze thinking and action using a systems perspective on sustainable infrastructure for a healthy economy and environment that benefits all.
- Explore the human and ethical dimensions of infrastructure.
- Identify science and education to supply tools and information that can drive local outcomes in alliance with global and national challenges.
- Advance teaching and educational infrastructure across disciplines and institutional types.
- Build collaborating communities of scholars and practitioners in business, government and civil society.

Monday, January 22, 2018

3:00 pm
Independence Foyer

Registration Opens

5:00 pm – 6:30 pm
Regency Foyer

Opening Reception
Light hors d'oeuvres

Tuesday, January 23, 2018

8:00 am
Independence Foyer
Regency Foyer

Registration and Exhibits Open
Coffee and Tea Service

8:45 am – 9:45 am
Regency Ballroom
CDEF

Welcome and Opening Remarks
James L. Buizer, Chair, NCSE Board of Directors and Professor, University of Arizona

Sustainable Infrastructure: Building Our Future
Michelle Wyman, Executive Director
National Council for Science and the Environment

Keynote Address: Science Diplomacy and Sustainable Infrastructure: Lessons from a Global Perspective
Ambassador Roman Macaya, Ambassador of Costa Rica to the United States

9:45 am – 10:45 am
Regency Ballroom
CDEF

Plenary 1: Sustainable Infrastructure: Building Resilience in the Face of Disasters
Moderator: Fuzz Hogan, Managing Editor, New America

Dr. Gerald E. Galloway, Jr., retired Brigadier General, Glenn L. Martin Institute Professor of Engineering, Department of Civil and Environmental Engineering, University of Maryland, College Park

Dr. Susan Cutter, Carolina Distinguished Professor of Geography and Director, Hazards Research Lab, University of South Carolina

Kevin Etter, Director, Public Health and Safety/Humanitarian Relief Programs, UPS

Dr. Louis Uccellini, NOAA Assistant Administrator for Weather Services and Director, National Weather Service

Grant Davis, Director, Water Resources Department, State of California

10:45 am – 11:00 am

Break

11:00 am – 12:30 pm

Symposia A

Potomac I	1. Resilience of Nature-based and Built Infrastructure
Potomac II	2. Sustainable Water and Wastewater Infrastructure for Cities in the Great Lakes Region
Potomac III	3. Sustainability and Resilience in Smart Cities
Kennedy	4. Environmental Restoration, Social Transformation & Community Resilience in the Caño Martin Peña, San Juan, Puerto Rico
Potomac IV	5. The Nation's Water Infrastructure
Potomac V	6. Take Action! Integrating Climate Change into Transportation Design and Planning
Potomac VI	7. Understanding Drivers of Change of Local GHG Emissions
Arlington	8. Optimizing Resilient Infrastructure Finance
Fairfax	9. Building the Urban Wood and Land Restoration Economy Business Model
Theatre	10. Sustainability in Coastal Plain Urban Centers of the Gulf Coast Region
Washington A	11. University Engagement with the Global Resilient Imperative
Washington B	12. Hurricanes and Infrastructure – Building Resiliency for Extreme Weather Events
Roosevelt	13. Accessing Federal Funding to Support Infrastructure Development
Lincoln	14. Energy Efficiency Programs in Low-Income Communities
Tidewater II	15. Ecosystem Services Education: Engaging Diverse Audiences with EnviroAtlas
Jefferson	16. Energy and Water Systems within the Urban Environment

12:30 pm – 1:45 pm
Regency Ballroom
CDEF

NCSE Lifetime Achievement Awards on Science, Service, and Leadership
Lunch Served

The Role of the Media Today
Robert B. Semple, Jr., Associate Editor of the Editorial Page, *The New York Times*
Introduction by **Thomas E. Lovejoy**, Senior Fellow at the United Nations Foundation and University Professor in the Environmental Science and Policy Department at George Mason University

The Future is Now
Edward Mazria, Founder and CEO, Architecture 2030
Introduction by **Christine McEntee,** Executive Director, American Geophysical Union

1:45 pm – 2:15 pm

Break

2:15 pm – 3:15 pm
Regency Ballroom CDEF

Plenary 2: Using Science to Inform Policy: Cross-Sector Solutions to Sustainable Infrastructure

Moderator: Kathleen Rogers, Executive Director, Earth Day Network

Shirlee Zane, Supervisor, Sonoma County, California

Camilla Seth, Executive Director, Sustainable Finance, JP Morgan Chase

Donna Givens, CEO/Executive Director, Eastside Community Network, Detroit

Kevin Rabinovitch, Global Vice President, Sustainability, Mars

Colin Wellenkamp, Executive Director, Mississippi River Cities and Towns Initiative

3:15 pm – 3:30 pm **Break**

3:30 pm – 5:00 pm **Symposia B**

Potomac I
1. Building national social infrastructure to support STEM educators

Potomac II
2. Artists as Partners in Infrastructure Education

Potomac III
3. USGS Support of Coastal Community Sustainability and Resiliency

Potomac IV
4. Testing resilience policy: What science is needed to define best practice, assess outcomes, and anticipate resilience change?

Potomac V
5. Green Infrastructure in Mexico: Valuing Ecosystem Services

Potomac VI
6. Developing a Business Case for Investing in Water Resilience

Washington A
7. Green Infrastructure and Resilience – A Win-Win Strategy

Washington B
8. Grid Security, Coal and Sustainable Post-mining Land and Water Use in the Appalachian Coal Mining Region of the USA

Roosevelt
9. Connecting green infrastructure and ecosystem service frameworks for resilience and sustainability in the built environment

Lincoln
10. A Participatory Infrastructure Assessment Technique: Towards Equitable, Sustainable, and Resilient Communities

Jefferson
11. Interdisciplinary approaches to advanced water resilience in the Clackamas watershed

Arlington
12. Practicing Design Thinking: Case Studies from Asia and Africa on Governance, Disaster Mitigation, and Sustainable Agriculture

Theatre
13. Climate Changes Health: Justice, Equity, Mitigation, and Activism

Kennedy
14. Community Resilience: Disasters, Development and Building with Nature

5:00 pm – 6:30 pm
Regency Foyer & Regency Ballroom AB

Reception and Poster Presentations

Welcoming remarks: Mike Carvalho, Incoming Chair of Board of Directors, NCSE, and **David Blockstein,** Chief Scientist, NCSE

Wednesday, January 24, 2018

8:00 am **Registration and Exhibits Open**

8:45 am – 9:45 am
Regency Ballroom CDEF

Plenary 3: Resilient Infrastructure and the Sustained National Climate Assessment

Moderator: Frank Sesno, Founder and Chief Executive, Planet Forward, George Washington University

Alice Hill, Research Fellow, Hoover Institute, Stanford University

Dr. David Titley, Professor of Practice in Meteorology and Professor of International Affairs at the Pennsylvania State University

Dr. Richard Holland Moss, Senior Scientist, Joint Global Change Research Institute, Pacific Northwest Laboratory, University of Maryland

Dr. Virginia Burkett, Chief Scientist, Climate and Land Use Change, US Geological Survey (USGS), Acting Chair, Subcommittee on Global Change Research, U.S. Global Change Research Program

9:45 am– 10:45 am
Regency Ballroom CDEF

Plenary 4: Teaching to the Future: Education for Sustainability

Moderator: Dr. Christopher Boone, Dean, School of Sustainability, Arizona State University

Dr. David Orr, Paul Sears Distinguished Professor of Environmental Studies and Politics at Oberlin College and James Marsh Professor at the University of Vermont

Dr. Debra Rowe, Faculty, Sustainable Energies & Social Sciences, Oakland Community College, President, US Partnership for Education for Sustainable Development

Dr. William Easterling, Assistant Director for Geosciences, National Science Foundation (NSF)

Earyn McGee, Master's student, School of Natural Resources and the Environment, University of Arizona

10:45 am – 11:00 am **Break**

11:00 am – 12:30 pm **Symposia C**

Potomac I
1. Scaling up Renewables in Higher Ed to Curb Climate Change

Kennedy
2. Integrating the built and natural environments for human and environmental health: what building rating systems can teach us

Potomac II
3. Bringing climate and weather impacts knowledge to infrastructure problems: NOAA's RISA program

Potomac III
4. Weathering the Storm: Integrating Climate Risks into Infrastructure Financing

Potomac IV
5. Encouraging Stormwater Green Infrastructure Implementation: Engagement, Experience, and Economics

Potomac VI
6. Designing Urban Resilience beyond the Science: The Project of the Future

Lincoln
7. The food, energy, water (FEW) nexus – addressing aspects of assessment and transformation

Tidewater II
8. Building resilience through the climate science and social equity nexus.

Roosevelt
9. Case Studies of Employing Model Based Reasoning to Improve Transdisciplinary Collaboration Competencies

Washington B
10. From Provision to Use: Closing the Gap in Climate Resilience for Critical Infrastructure

Potomac V
11. Communities and Scientists Working Together: Co-Designing Decision-Relevant Science

Washington A
12. The Next Generation of Sustainable Urban Systems (SUS) Science

Jefferson
13. Achieving an integrated surface transportation system for all users

Fairfax
14. Multi-Species Buildings & Infrastructure

Arlington
15. Perspectives in sustainable resilience: Integrating Earth observation data into community-level processes

Theatre
16. Warning Signs: Assessing the Societal and Environmental Impact of Proposed Federal Funding Cuts to Environmental and Climate Research and Development Programs

12:30 pm – 2:00 pm **Ambassador Gérard Araud, Keynote Address**
Regency Ballroom CDEF
Ambassador of France to the United States
Lunch Served

Introduced by **Dr. Rita R. Colwell**, Distinguished University Professor, University of Maryland at College Park and Johns Hopkins University Bloomberg School of Public Health

Remarks by by **Barbara Hendrie,** North America Director, UN Environment

2:00 pm – 5:00 pm **Workshops**

Potomac I
1. Energy-Water Nexus Policy Integration: Toward New Strategies for States and the Federal Government

Potomac II
2. Partnerships for Building a Sustained National Climate Assessment

Potomac III
3. Paths to Addressing Climate Risk in the Design, Construction and Operation of the Built Environment

Arlington
4. Inventorying and Analyzing Urban Green Infrastructure for Community Resilience: Best Practices

Fairfax
5. The Backbone of Sustainable Infrastructure: Cooperative Ownership & Public Banks

Potomac V
6. Co-designing Community Resilience: A hands on workshop to launch new community science projects

Washington A
7. Are Distributed Infrastructure Systems More Sustainable than Centralized Systems? An Integrated Multiple Infrastructure Perspective from Cities

Washington B
8. The Future of Cities and Urban Sustainability (FoCUS)

Tidewater I
9. Industrial Ecology and Design: a toolkit for designing sustainable systems

Tidewater II
10. Innovations and Success Stories in Sustainable Water Management at the Federal, State, and Local Levels

Potomac IV
11. Improve Collaboration for Building Resilience: Leverage Differences Among Collaborators

Lincoln
12. Vacant to Vibrant: Great Lakes repurposing of vacant land for community and ecosystem benefit and resilience

Jefferson
13. A Climate Resiliency Decision Support Tool

Potomac VI
14. Rebuilding Puerto Rico & Caribbean Islands - Integrated Approach to Resiliency, the Energy & Water

Kennedy
15. Pathways to Sustainability Education in America's Community Colleges

Roosevelt
16. Accessing Federal Funding to Support Infrastructure Development

5:00 pm **Reception and Poster Presentations**
Regency Foyer & Regency Ballroom AB

6:00 pm **John H. Chafee Memorial Lecture on Science, Policy and the Environment**
Regency Ballroom CDEF
Senator Sheldon Whitehouse (D-RI)

7:00 pm **Closing Remarks**
Regency Ballroom CDEF

Keynotes

Ambassador Roman Macaya, Ambassador of Costa Rica to the United States

Roman Macaya was sworn in as Ambassador of Costa Rica to the United States of America on August 20, 2014. Roman has developed a multidisciplinary career as a scientist, businessman, advocate, politician and academic. Roman has lived, studied and worked for many years in both Costa Rica and the United States. As a chemist and biochemist by training, Roman has led R&D teams in the fields of biotechnology and biomedical research. He served as Senior Scientist at PharmaGenics, a U.S. biotechnology company that was acquired by Genzyme. Roman was hired by PharmaGenics to set up and manage the Structural Chemistry Laboratory and was named Scientist of the Year by the company for his research contributions on a new pre-clinical drug candidate for cardiovascular disease.

Roman´s interest in developing real-world applications from scientific innovation, as well as his awareness of the implications of many innovations to health care, led him to seek an MBA in health care management. In the field of health care, he served as Director of Business Development for ICIC, a Contract Research Organization conducting clinical trials, Chief Investment Officer for a health care private equity fund at Mesoamerica Investments, and Managing Partner at Sanigest, a health care consulting firm. Roman has also served as General Manager of RIMAC, a family business in the chemical field based in Costa Rica.

Roman has dedicated much effort aimed at understanding the strengths and weaknesses of the Costa Rican health care system and has been a frequent media source on this topic for over fifteen years. He has also been critical of the economic and social consequences of ever-expanding provisions of intellectual property on health care, agriculture and development, and has participated in numerous debates on how to strike the right balance between incentives for innovation and the common good.

Ambassador Gérard Araud, Ambassador of France to the United States

Mr. Gérard Araud, a career diplomat, was appointed Ambassador of France to the United States in September 2014. He previously held numerous positions within the Ministry of Foreign Affairs and International Development, notably including that of Director for Strategic Affairs, Security and Disarmament (2000-2003), Ambassador of France to Israel (2003-2006), Director General for Political Affairs and Security (2006-2009), and, most recently, Permanent Representative of France to the United Nations in New York (2009-2014).

Mr. Araud has developed specialized knowledge in two key areas: the Middle East and strategic & security issues. He was the French negotiator on the Iranian nuclear issue from 2006 to 2009. In New York, at the Security Council, he notably contributed to the adoption of resolutions on Libya (#1970 and #1973), Côte d'Ivoire (#1975), the Democratic Republic of Congo, Mali and the Central African Republic, and participated in debates on the Syrian and Ukrainian crises.

John Chafee Memorial Lecture on Science, Policy, and the Environment

Senator Sheldon Whitehouse

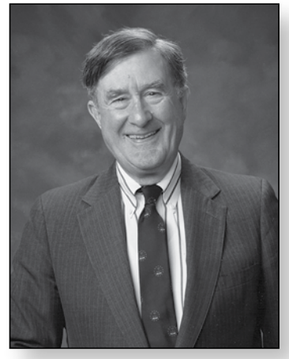
U.S. Senator Sheldon Whitehouse (D-RI) is fighting to reduce carbon pollution, protect our air and water, and position America as a leader in the clean energy economy. As a member of the Senate Environment and Public Works Committee, he plays a key role in crafting policies addressing climate change and environmental protection. He has earned a lifetime score of 98 percent on the League of Conservation Voters' National Environmental Scorecard.

Every week, Sen. Whitehouse speaks out in the Senate, urging Congress to wake up to the threat of climate change. He co-founded the Senate Climate Action Task Force to help build support for action to address carbon pollution. Whitehouse has also introduced legislation to put a fee on carbon, establishing a market incentive to reduce emissions while generating substantial revenue to be returned to the American people. Since 2013, Senator Whitehouse has attended the annual Munich Security Conference, where he has headlined discussions of the implications of climate change on international security.

In 2011, Sen. Whitehouse formed the bipartisan Senate Oceans Caucus to respond to the pressures of pollution and commercial activity. He has also passed legislation establishing a National Oceans and Coastal Security Fund, a dedicated funding source for ocean and coastal research and restoration.

A graduate of Yale University and the University of Virginia School of Law, Whitehouse served as Rhode Island's U.S. Attorney and state Attorney General before being elected to the United States Senate in 2006.

Senator John H. Chafee (1922 – 1999)



Senator John H. Chafee earned degrees from Yale University and Harvard Law School. Upon the United States' entry into World War II, Chafee left Yale to enlist in the Marine Corps, and then served in the original invasion forces at Guadalcanal. In 1951 he was recalled to active duty and commanded a rifle company in Korea.

After six years in the Rhode Island House of Representatives, Chafee was elected Governor in 1962; he was re-elected in 1964 and 1966. In January 1969 he was appointed Secretary of the Navy and served in that post for three and a half years. He was elected to the United States Senate in 1976. As Chairman of the Environment and Public Works Committee, the Senator was a leading voice in crafting the Clean Air Act of 1990. He led successful efforts to enact oil spill prevention and response legislation and a bill to strengthen the Safe Drinking Water Act. Senator Chafee was a long-time advocate for wetlands conservation and open space preservation and was the recipient of every major environmental award.

John Chafee was a Republican, a committed conservationist, and a political leader who worked across party lines to advance environmental protection.

Lifetime Achievement Awards

Edward Mazria

Edward Mazria is an internationally recognized architect, author, researcher, and educator. His seminal research into urbanization, climate change, sustainability, energy consumption, solar energy, and greenhouse gas emissions in the built environment has redefined the role of architecture, planning, design, and building, in reshaping our world. He is the founder and CEO of Architecture 2030, a think tank developing real-world solutions for 21st century problems, and host of the AIA+2030 Professional Education Series, China Accord, the 2030 Districts movement in North American cities, the Zero Tool and Achieving Zero – a framework of incremental building sector actions to ensure a carbon neutral built environment by the year 2050. Mr. Mazria recently introduced the 2030 Palette, a revolutionary new platform that puts the principles behind carbon neutral and resilient built environments at the fingertips of architects, planners, and designers worldwide.

This past year, he delivered the Roadmap to Zero Emissions to the United Nations Framework Convention on Climate Change (UNFCCC) – a flexible approach to achieve zero CO2 emissions in the built environment by mid-century. He also issued the 2050 Imperative – a commitment to plan and design to carbon neutral standards – which has been adopted by the International Union of Architects and all regional professional organizations (representing over 1.3 million architects) in 124 countries worldwide.

Robert B Semple, Jr

Robert B Semple, Jr. recently retired from the New York Times where he was, Associate Editor of the Editorial Page. He joined the Washington Bureau of The Times in the fall of 1963. He covered housing and civil rights during the Johnson administration, spent a year covering President Johnson himself, and served as White House correspondent during Richard Nixon's first term. He served thereafter as deputy national editor (1973-75), London bureau chief (1975-77), foreign editor (1977-82), editor of the Op-Ed Page (1982-88) and associate editor of the Editorial Page (1988 to retirement). He received the Pulitzer Prize in 1996 for his editorials on environmental issues.

Plenary 1

Sustainable Infrastructure: Building Resilience in the Face of Disasters
Moderator: Fuzz Hogan, Managing Editor, New America

Fuzz Hogan oversees the Editorial, Events and Communications Department and is a member of the Leadership Team of New America. Fuzz served as executive producer at Planet Forward, a media project of the Center for Innovative Media at the George Washington University, which focused on finding and curating innovative ideas in energy and sustainability. He served as director of communications for the education advocacy organization, Advance Illinois. He spent nearly 20 years at CNN, including as Midwest Bureau Chief, and the director of coverage for CNN/U.S. In 2002, he was co-Executive Producer of CNN's "Terror on Tape" series, which won a Peabody award.

Gerald Galloway, Jr. is Glenn L. Martin Institute Professor of Engineering, Department of Civil and Environmental Engineering and an Affiliate Professor, School of Public Policy, University of Maryland, College Park, Maryland, where his focus is on water resources policy and management. He is also a Visiting Scholar at the US Army Corps of Engineers Institute for Water Resources. He joined the faculty of the University of Maryland following a 38 year career in the U.S. Army, retiring as Brigadier General, and served eight additional years in the federal government, most of which was associated with water resources management. He served for three years as District Engineer for the USACE in Vicksburg, MS and later, for seven years as a Presidential appointee to the Mississippi River Commission. Dr. Galloway was elected to the National Academy of Engineering in 2004.

Dr. Susan L. Cutter is a Carolina Distinguished Professor of Geography at the University of South Carolina where she directs the Hazards and Vulnerability Research Institute. Her latest book is Hurricane Katrina and the Forgotten Coast of Mississippi.She serves as Vice-Chair of the international Integrated Research on Disaster Risk Science Committee supported by ISSC, ICSU, and UN-ISDR She also chaired the committee that produced the recent National Research Council report, Disaster Resilience: A National Imperative. She is an elected as a Fellow of the American Association for the Advancement of Science (AAAS) (1999). She is also past President of the Association of American Geographers (2000) and past President of the Consortium of Social Science Associations (COSSA) (2008). In 2011 she received the Lifetime Achievement Award from the Association of American Geographers.

Louis W. Uccellini is the National Oceanic and Atmospheric Administration (NOAA) Assistant Administrator for Weather Services and Director of the National Weather Service. Prior to this position, he served as the Director of the National Centers for Environmental Prediction (NCEP) for thirteen years. He was elected an American Meteorological Society (AMS) Fellow in 1987 and served as AMS president from 2012 to 2013. He has received the U.S. Presidential Meritorious Executive Rank Award (2001), the U.S. Presidential Distinguished Rank Award (2006, 2016), and American University's Roger W. Jones Award (2016) for his exceptional public service and dedication to the work and goals of government.

Tamara Barker, Chief Sustainability Officer, UPS, leads a dedicated engineering group that manages global sustainability data for reporting. Her team oversees a cross-functional Sustainability Working Committee and a Sustainability Directors Committee that establishes key performance indicators and goals for the company. Barker is a member of the Corporate Sustainability Steering Committee, which includes five executives from UPS's Management Committee, the top tier of the company's management structure. As Vice President of Environmental Affairs, Barker has responsibility for UPS's Environmental Compliance programs, controlling hazardous waste management and the transportation of hazardous materials. Barker, a nearly 30-year UPS veteran, joined the company in 1988 as a UPS package delivery driver in Ohio. She has held positions of increasing responsibility over the years, primarily in Plant Engineering.

Grant Davis was appointed Director of the California Department of Water Resources by Governor Edmund G. Brown Jr. in August 2017. Davis was been the General Manager of the Sonoma County Water Agency (SCWA) since 2009, where he also served as the Assistant General Manager. Davis was responsible for SCWA's core functions of maintaining nearly 100 miles of streams and detention basins for flood protection, restoring habitat for three federally listed fish species in the Russian River, delivering drinking water to more than 600,000 residents of Sonoma and Marin counties, and providing wastewater management for 60,000 customers. Davis was Executive Director from 1997 – 2007 of The Bay Institute – a science-based, non-profit organization dedicated to protecting the San Francisco Bay-Delta watershed and improving water management in California.

Plenary 2

Using Science to Inform Policy: Cross-Sector Solutions to Sustainable Infrastructure
Moderator: Kathleen Rogers, President, Earth Day Network

Kathleen Rogers (Moderator) is the President of Earth Day Network, and a tireless advocate for environmental action and social justice. Under her leadership, Earth Day has continued to grow and now includes annual participation of over one billion people in 192 countries. Kathleen has developed Earth Day Network into a dynamic, year-round policy and activist organization. Kathleen founded Earth Day Network's groundbreaking Billion Acts of Green program, which has now recorded close to 3 billion individual actions taken to improve the environment. Kathleen held senior positions with the National Audubon Society, where she was Chief Wildlife Counsel, the Environmental Law Institute, and two U.S. Olympic Organizing Committees.

Supervisor **Shirlee Zane** has represented Sonoma County California's Third District since 2008. Prior to taking office, Zane served as the CEO of Sonoma County's Council on Aging, a private nonprofit corporation that provides services for seniors countywide. Zane serves as a Director for the Bay Area Air Quality Management District, Sonoma Marin Area Rail Transport (SMART) and the Sonoma County Transportation Authority/Regional Climate Protection Authority (SCTA/RCPA). She chaired the Solid Waste Advisory Group and serves as a Director for the Sonoma County Waste Management Agency. She has led progress at Sonoma County's Permit and Resource Management Department, where 72% of permits are now issued the same day. Zane works and lobbies with the Sonoma County Water Agency (SCWA) to secure federal funding for County and regional water projects. Zane has been influential in building support for the San Francisco Bay Area Advanced Quantitative Precipitation Information (AQPI) project that will help water managers better manage precious water resources within reservoirs. Zane was also instrumental in the development of a Groundwater Management Plan for the Santa Rosa Plain.

Camilla Seth joined JPMorgan Chase in 2012 as Executive Director for Sustainable Finance. She is focused on conservation and climate finance, stakeholder engagement, and policy development. She is the group lead on Green Bonds and manages the firm's partnership with The Nature Conservancy. Camilla has over 20 years of experience working on sustainable finance issues for financial institutions, corporations, and nonprofit organizations. She has advised leading commercial and investment banks on sustainability strat-

egy formulation, environmental and social risk management, the identification of environmentally-beneficial investment opportunities and stakeholder engagement. Camilla was the founding Director of Programs and Operations at the Global Impact Investing Network (GIIN), where she organized leading institutional investors around collaborative investment and impact measurement, and the creation of new investment vehicles. She served as Vice President of Environmental Affairs at Citigroup, where she managed environmental initiatives across the investment bank and directed global environmental philanthropy. Camilla was Program Officer for the Environment at the Surdna Foundation, a family foundation in New York City, where she managed climate change and biodiversity protection initiatives.

Donna Givens, CEO/Executive Director, Eastside Community Network, Detroit, has 30 years of nonprofit leadership experience including serving as president of the Youth Development Commission in Detroit and deputy director of programs for Warren/Connor Development. Givens also served as executive director of Brightmoor Community Center and as a partner in the Beverly Hills, Mich.-based Visions Education Development Consortium LLC. Prior to that, she was executive director of Vanguard Community Development Corp. and vice president, programs at Big Brothers Big Sisters of Metropolitan Detroit.

Kevin Rabinovitch is the Global VP Sustainability and Chief Climate Officer for Mars, Incorporated. He leads the corporate strategy for the environmental portions of Mars' Sustainable in A Generation Plan as well as the program for their direct operations including more than 400 facilities globally. His team manages a global portfolio of renewable energy projects in conjunction with efficiency work led by the business units. He leads the assessment of environmental impact for Mars' entire value chain and the translation of external environmental science into policy and strategy. Kevin is the Lead Corporate Director on the Board of The Sustainability Consortium, Mars' representative in the Corporate Consultative Group at the World Resources Institute, leads Mars' environmental engagement with the Consumer Goods Forum. He has been with Mars for 23 years.

Colin Wellenkamp is the Executive Director of the Missouri River Cities and Towns Initiative (MRCTI). Since 2012, the MRCTI has been promoting economic and environmental security and stability along the Mississippi River Corridor. Colin's extensive career in the legal and policy fields has been focused on advocating and advancing public interests through improving local government functions and the activity of the business world. He is dedicated to assisting organizations and people transition to a sustainable way of life.

SPEAKER BIOGRAPHIES

Plenary 3

Resilient Infrastructure and the Sustained National Climate Assessment

Moderator: Frank Sesno, Founder and Chief Executive, Planet Forward, George Washington University

Emmy Award-winning journalist **Frank Sesno** is the Director of The George Washington University School of Media and Public Affairs and the creator and host of Planet Forward. He was formerly CNN's DC bureau chief, as well as anchor, interview host and White House correspondent. He was the long-running host of CNN's Sunday talk show Late Edition, and is now a frequent guest host for CNN's Reliable Sources.

Alice Hill is a Research Fellow at the Hoover Institution where her work focuses on building resilience to destabilizing catastrophic events, including the impacts of climate change. Prior to joining Hoover, she served as Special Assistant to President Obama and Senior Director for Resilience Policy for the National Security Council. Hill led the development of national policy regarding national security and climate change, incorporation of climate resilience considerations into international development, Federal efforts in the Arctic, building national capabilities for long-term drought resilience, and establishment of national risk management standards for 3 of the most damaging natural hazards. Hill served as Senior Counselor to the Secretary of the Department of Homeland Security (DHS) and as an ex officio member of the Federal Advisory Committee for the National Climate Assessment. She led the DHS Task Force responsible for creating the first climate adaptation plans for DHS. Hill served as Supervising Judge on both the Superior and Municipal Courts in Los Angeles and as Chief of the white-collar crime prosecution unit in the Los Angeles United States Attorney's Office.

Richard H. Moss is a Senior Scientist at Pacific Northwest National Laboratory's Joint Global Change Research Institute and Adjunct Professor in the Department of Geographical Sciences at the University of Maryland, College Park. Moss's research on global environmental change focuses on scenarios (including the Representative Concentration Pathways (RCPs), uncertainty characterization in integrated models and scientific assessments, and methods for evaluating potential consequences of interacting societal and environmental changes. Moss has held several public service positions including Director of the US Global Change Research Program/Climate Change Science Program

Office (spanning the Clinton and G.W. Bush Administrations) and technical support director for one of the working groups of the Intergovernmental Panel on Climate Change. Moss chairs the Federal Advisory Committee for the Sustained US National Climate Assessment and the National Academy of Science's Board on Environmental Change and Society. He is a fellow of the American Society for the Advancement of Science, a National Associate of the National Research Council, and a Distinguished Associate of the US Department of Energy.

Admiral David Titley is a Professor of Practice in Meteorology and a Professor of International Affairs at the Pennsylvania State University. He is the founding director of Penn State's Center for Solutions to Weather and Climate Risk. He served as a naval officer for 32 years and rose to the rank of Rear Admiral. Dr. Titley's career included duties as commander of the Naval Meteorology and Oceanography Command; oceanographer and navigator of the Navy; and deputy assistant chief of naval operations for information dominance. Dr. Titley initiated and led the U.S. Navy's Task Force on Climate Change. After retiring from the Navy, Dr. Titley served as the Deputy Undersecretary of Commerce for Operations, the chief operating officer position at the National Oceanic and Atmospheric Administration. Dr. Titley received an honorary Doctorate degree from the University of Alaska Fairbanks, and is a fellow of the American Meteorological Society.

Virginia Burkett is the Chief Scientist for Climate and Land Use Change at the U.S. Geological Survey (USGS). She is Co-chair of the U.S. Global Change Research Program and the alternate U.S. Principal to the international Group on Earth Observations (GEO). She has served at the USGS as Chief of the Wetlands Ecology Branch at the USGS National Wetlands Research Center, Deputy Regional Chief Biologist and, more recently, as the Associate Director for the Climate and Land Use Change Mission Area. Burkett was Secretary/Director of the Louisiana Department of Wildlife and Fisheries, where she had served as Deputy Director. She has directed the Louisiana Coastal Zone Management Program and was Assistant Director of the Louisiana Geological Survey. She served on Louisiana's Science and Engineering Board for the state's first comprehensive coastal restoration Master Plan.

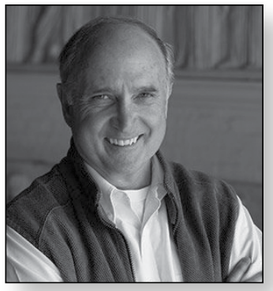
Plenary 4

Teaching to the Future: Education for Sustainability
Moderator: Dr. Christopher Boone, Dean, School of Sustainability, Arizona State University

Christopher Boone (moderator), is Dean of School of Sustainability, Arizona State University His research contributes to ongoing debates in sustainable urbanization, environmental justice, vulnerability, and global environmental change. He is a scientist for the urban Long Term Ecological Research projects based in Baltimore and Phoenix and sits on the scientific steering committee for the Urbanization and Global Environmental Change project. He is an active contributor to Future Earth, an international initiative that aims to integrate the global environmental change community with a focus on sustainable outcomes. Boone serves on the Executive Committee of the Council of Environmental Deans and Directors. He is the author of two books on urban sustainability, City and Environment and Urbanization and Sustainability.

William E. Easterling, III was appointed Assistant Director of Geosciences at the National Science Foundation on June 1, 2017. A Fellow of the American Association for the Advancement of Science, he was the dean of the College of Earth and Mineral Sciences, unding director of the Penn State Institutes of Energy and the Environment, founding director of the Penn State Institutes of Energy and the Environment and professor of geography and earth system science at Penn State. He held posts at the Illinois State Water Survey, Resources for the Future, Inc., and the University of Nebraska, Lincoln. He is an internationally recognized expert on how climate change likely will affect the Earth's food supply and was nominated by the White House to serve as a convening lead author on the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment's Chapter on Food, Fibre, Forestry, and Fisheries. The lead authors of the IPCC Assessment Report were co-awarded the 2007 Nobel Peace Prize with former Vice President Al Gore.

Debra Rowe is the president of The US Partnership for Education for Sustainable Development. She is a national co-coordinator of the Higher Education Associations Sustainability Consortium, founder of the Disciplinary Associations' Network for Sustainability and senior advisor to the Association for the Advancement of Sustainability in Higher Education. Dr. Rowe has been a professor of energy management, renewable energy technology and psychology for over 28 years at Oakland Community College.



David W. Orr is Paul Sears Distinguished Professor of Environmental Studies and Politics Emeritus and senior advisor to the president of Oberlin College. He is a founding editor of the journal Solutions, and founder of the Oberlin Project, a collaborative effort of the city of Oberlin, Oberlin College, and private and institutional partners to improve the resilience, prosperity, and sustainability of Oberlin. In the past 25 years, he has served as a board member or advisor to eight foundations and on the boards of many organizations, including the Rocky Mountain Institute and the Aldo Leopold Foundation. Currently he is a trustee of the Alliance for Sustainable Colorado and the Children and Nature Network. He has been awarded eight honorary degrees and a dozen other awards including a Lyndhurst Prize, a National Achievement Award from the National Wildlife Federation, and a Visionary Leadership Award from Second Nature.

Earyn McGee is a 2nd year Master's student in the School of Natural Resources and the Environment at the University of Arizona. Her current research interests includes herpetology and community ecology. She has been sampling lizard and insect communities in the Chiricahua Mountains along perennial and ephemeral streams to quantify how the loss of aquatic prey (i.e. aquatic insects emerging from streams) during drought could negatively impact lizards in riparian areas. She is also interested in diversity and inclusion. She is a graduate student mentor for the Doris Duke Conservation Scholars Program. She participated in the National Council for Science and the Environment (NCSE)'s EnvironMentors program and was an intern with NCSE helping to manage EnvironMentors. Earyn plans to expand on her research during a PhD program as well as continuing mentoring students.

Symposia A

TUESDAY, JANUARY 23
11:00 AM - 12:30 PM

S-A 1 Resilience of Nature-Based and Built Infrastructure

Nature provides multiple benefits to society. One of those is nature-based infrastructure. In contrast to built infrastructure, nature-based infrastructure maintains itself while it protects society, bolstering a community's resilience. Here we explore the benefits of nature-based and built infrastructure, and how nature-based infrastructure can be amplified to benefit society. We do this by converging multiple perspectives and disciplines to provide examples to practitioners so that they can foster resilience in their own systems. The session will draw from diverse perspectives to: 1. Show practitioners how nature-based solutions bolster system resilience, 2. Provide examples of communities already using nature-based solutions to build resilience in their systems, 3. Analyze how nature-based and built infrastructure uniquely contribute to community resilience goals, 4. Explain how and where nature-based solutions are most effective (e.g., coastal marshes, riparian buffers) and the multiple benefits they provide in addition to resilience, including clean air and water provisioning, native habitat, and climate change mitigation.

Speakers:

Hannah E. Birge, Water and Agriculture Program Manager, The Nature Conservancy in Nebraska, Adjunct Faculty, University of Nebraska, Lincoln

Terri Norton, Associate Professor of Construction Engineering and Architectural Engineering University of Nebraska, Lincoln

John Carroll, Director of the School of Natural Resources, University of Nebraska, Lincoln (moderator)

Craig R. Allen, Nebraska Cooperative Fish and Wildlife Unit Leader, University of Nebraska Lincoln

Dirac Twidwell, University of Nebraska-Lincoln

Igor Linkov, Risk and Decision Science Focus Area Lead, US Army Engineer Research and Development Center

Judith Rodriguez, Research Associate at Zofnass Program for Sustainable Infrastructure, Harvard University

S-A2 Sustainable Water and Wastewater Infrastructure for Cities in the Great Lakes Region

Many US municipalities confront serious challenges due to aging water and wastewater infrastructure. Reduced funding, stricter environmental standards, emerging threats like climate variability and declining populations have resulted in a "perfect storm" of sorts for many communities in the Great Lakes region. In this backdrop, communities are identifying innovative ways to address this crisis. This panel will present the experience of some of these communities, along with a broader outlook on the challenges and opportunities in building resiliency and making water infrastructure in these communities sustainable in the long-term.

Speakers:

Sridhar Vedachalam, Director, Safe Drinking Water Research and Policy Program

Mark Fisher, CEO, Council of the Great Lakes Region

Nancy G. Love, University of Michigan, Professor, Department of Civil and Environmental Engineering

John Dickert, President and CEO, Great Lakes and St. Lawrence Cities Initiative

S-A3 Sustainability and Resilience in Smart Cities

Smart and connected technologies are quickly being developed, tested, and deployed across all sectors of the society and economy – transportation, utilities and energy, health, facilities, education, public safety, and others. While these advances have the power to bring about significant improvements in the management, implementation, and maintenance of these systems, it is critical for long term viability and progress that they are developed with an eye towards sustainability considering changing climatic conditions and growing urban populations. Many smart systems can be designed to ensure greater levels of resilience across systems and regions or cities. While sustainability and resilience are goals of many of the new systems and technologies that are being developed and deployed, they are often secondary or indirect benefits of Smart City implementation.

This symposium will explore how a variety of organizations are developing both smart and sustainable technologies or tools. Panelists will briefly present on case studies and perspectives on smart and connected technologies or data for urban systems and how they are or might contribute to a more resilient Smart City. Then all will participate in an information exchange and conversation on how Smart Cities programs can make resilience and sustainability more prominent and effective components.

Speakers:

Tanya Maslak, Battelle Memorial Institute (moderator)

Dominie Garcia, Smart Cities Program Lead, Battelle Memorial Institute

Brenna Berman, Executive Director, City Digital

Shahan Haq, Thriving Earth Exchange (TEX), American Geophysical Union

Samuel Tabory, Sustainable Healthy Cities Network, University of Minnesota

S-A4 Environmental Restoration, Social Transformation & Community Resilience in the Caño Martin Peña, San Juan, Puerto Rico

In this session, you will learn about the Caño Martín Peña ENLACE Project and its breakthroughs in terms of community organization, participatory planning and design, sustainable infrastructure development, and community economic development, among others. You will learn how the intrinsic relation between the Caño Martín Peña – a 3.75-mile long tidal channel in the heart of San Juan, Puerto Rico – and the surrounding communities has presented both challenges and opportunities in terms of community engagement, action, and empowerment, innovative thinking and participatory design, leading to progress, international recognition and shared knowledge. In addition, you will learn how the organized communities, in partnership with the private and public sector, work together to restore the environmental integrity of the channel, protect the health and safety of its residents, prevent gentrification, foster socioeconomic development, and ensure accessible public spaces and affordable housing through participative, inclusive and democratic processes.

Speakers:

Luis Carlos Robles, Property Management Coordinator for the Caño Martín Peña Community Land Trust

Estrella D Santiago Pérez, Environmental Affairs Manager, Corporación del Proyecto ENLACE del Caño Martín Peña

S-A5 The Nation's Water Infrastructure

What are the issues involved in the nation's water delivery system/ infrastructure? Speakers will discuss Water and wastewater—history of development needs and concerns; Chemical contamination due to aging infrastructure—health and economics; Native American water supplies—population centers for the most good; Risk Assessment of Select Chemicals Derived from Piping Infrastructure.

Speakers:

Jane Valentine, Associate Professor, UCLA Fielding School of Public Health

Joseph Kane, Research Associate, The Brookings Institution

Michael Hoffman, Professor, Division of Engineering and Applied Science, California Institute of Technology

Harry Allen, Chief, Emergency Response Section, Environmental Protection Agency, Region 9

S-A6 Take Action! Integrating Climate Change into Transportation Design and Planning

This session will highlight recent and ongoing efforts that transportation agencies are taking to integrate climate science into decision-making and everyday practices. The examples demonstrate that agencies need: (1) accessible climate information on the impacts that they need to prepare for; and (2) clear internal guidance on how to integrate that information into both strategic and tactical decision making.

- The Port Authority of New York and New Jersey has implemented Design Guidelines on Climate Resilience.
- Maryland Department of Transportation/State Highway Administration has developed a CoastSmart program with guidance for building in the coastal zones and integrated sea level rise considerations in their NEPA process.
- The Massachusetts Bay Transportation Authority (the T) in Boston, is institutionalizing resiliency through system-wide policy and embedding climate change awareness and consideration in all capital projects moving forward.
- Delaware Department of Transportation (DelDOT) has developed a Strategic Implementation Plan for Climate Change, Sustainability, and Resilience for Transportation.
- ICF is currently preparing a handbook for an Airport Cooperative Research Program (ACRP) project on how to integrate climate risk into existing management systems.

This session will provide examples of how these groups are making climate information accessible and integrating future risk information into their transportation decision-making practices. They'll share best practices and lessons learned to help enable other practitioners to take their own next steps to make climate considerations part of everyday practice.

Speakers:

Cassie Bhat, Manager, Climate Adaptation and Resilience, ICF

Marybeth Riley-Gilbert, Climate Change Resiliency Specialist, Massachusetts Bay Transportation Authority (MBTA)

Elizabeth Habic, Climate Risk and Resiliency Program Manager, Maryland Department of Transportation/ State Highway Administration (SHA)

Sarah Hammitt, Climate Resilience Specialist, Port Authority of New York and New Jersey (PANYNJ)

Jim Pappas, PE, Deputy Director of Transportation Solutions, Delaware Department of Transportation (DelDOT)

S-A7 Understanding Drivers of Change in Local GHG Emissions

Since the mid-1990s, local governments have engaged in periodic inventories of municipal and community greenhouse gas (GHG) emissions with the ultimate goal of achieving emission reductions. The field has matured with documented protocols for performing and reporting inventories, and many communities are now conducting inventory updates to establish trends. The Cities Leading through Energy Analysis and Planning (C-LEAP) project enhances the GHG inventory practice by creating methods and tools to attribute changes between two inventories to the impacts of policies and programs along with other external drivers, such as economic activity and weather. This framework will support policy-makers in using data to better communicate about their progress and refine their policy approaches.

Speakers:

Eli Yewdall, Senior Program Officer, ICLEI - Local Governments for Sustainability USA

Shawn Megill Legendre, Delaware Valley Regional Planning Commission

Maia Davis, Metropolitan Washington Council of Governments

S-A8 Optimizing Resilient Infrastructure Finance

The evermore present impacts of climate change are increasing the need for large-scale investment in resilient infrastructure around the globe. All traditional sources of financing for these projects like government funding, international financial institutions, banking project financing and private funding present increasing limitations of the available resources. Making existing and new infrastructure projects resilient requires significant additional investments which must be justified and secured in competition with other priorities. Identifying the most appropriate funding approach or vehicle for resilient infrastructure projects will often determine the success or failure of the project. Against this background, this Symposium presents several emerging considerations that will advance the state of play in assessing financing options for climate-resilient infrastructure across key sectors.

Roger Feldman will introduce the financing options in the energy sector as it moves towards enhanced reliability and resilience. David Baxter will explain why public-private partnerships (PPPs), as a form of blended finance, are becoming the vehicle of choice for many infrastructure projects, both in the US and around the world. Vladimir Antikarov will build on these two presentations by articulating why Real Options Analysis (ROA) is a superior methodology for evaluating the financial aspects of resilient infrastructure projects. Ira Feldman will offer an update on emerging metrics and standards -- from a range of policy, standardization and finance initiatives -- that are already redefining how we think about the financing of resilient infrastructure.

Speakers:

Ira R. Feldman, President and Senior Counsel, Greentrack Strategies

Roger Feldman, Andrews Kurth

David Baxter, International Development Consultant

Vladimir Antikarov, Founder & President, Verea Group

SYMPOSIA OVERVIEW

S-A9 Building the Urban Wood and Land Restoration Economy Business Model

The US Forest Service has a long history of working in and with communities to restore land and watersheds. Whereas most of this work takes place in rural or semi-rural areas, research and coordination work being done by the Forest Service and partners is facilitating community transformation in blighted neighborhoods of Baltimore. By some estimates, there are up to 40,000 abandoned homes in Baltimore. Many of these homes are made of materials, including brick and wood, which can be re-used rather than being sent to the landfill. The sale and re-use of this material pays for the added costs associated with carefully deconstructing a house, rather than quickly demolishing it. Deconstructing a house creates six to eight times as many jobs as demolition, and creates jobs for people who may otherwise have difficulty finding employment. After a house is deconstructed, a vacant lot stands in its wake. Working with local partners, the Forest Service is helping to transform vacant lots into beautiful green spaces that contribute to the vitality and health of neighborhoods and its residents. This is being achieved through the creation of GROW (Green Resources and Outreach for Watersheds) Centers and the Green Pattern Book and Registry.

By weaving together the pieces and bringing disparate partners to the table, the Forest Service is leading the development of a business model for Urban Wood & Land Restoration Economy in Baltimore that can then be applied in communities across the country. This attracts private sector businesses willing to invest in a community, and promotes ecosystem restoration and economic development while improving the lives of people in community.

Speakers:

Sarah Hines, Urban Field Station Network Coordinator, US Forest Service (moderator)

Lauren Marshall, National Program Lead - Urban and Community Forestry, US Forest Service

Morgan Grove, Audiology Online

Jeff Carroll, Vice President, Details Deconstruction

Mark Cameron, Watershed Liaison, Baltimore City Department of Public Works

S-A10 Sustainability in Coastal Plain Urban Centers of the Gulf Coast Region

Given the tragic events in Houston, prior events in New Orleans, and projections of increased extremes in weather, there is a critical need to focus on issues of sustainability in coastal communities of the Gulf Coast Region. This session organized by the National Academies of Sciences, Engineering, and Medicine, focuses on the economic, social, and environmental relationship, including displacement of people and social economic implications along with environmental impacts. The session will also address needs for data, long-term monitoring and potential strategies for promoting sustainable infrastructure in coastal urban areas. Case examples will be presented by experts with experience in analyzing coastal urban regions involving science, technology, and sustainability issues.

Speakers:

Vaughan C Turekian, Senior Director of Science and Technology for Sustainability Program, The National Academies of Sciences, Engineering, and Medicine

Suzette Kimball, Senior Advisor and Director Emeritus, U.S. Geological Survey

William Easterling, Assistant Director for Geosciences, National Science Foundation

Denise Reed, Professor, University of New Orleans

Toby Baker, Commissioner, Texas Commission on Environmental Quality (TCEQ)

S-A11 University Engagement with the Global Resilient Imperative

In our increasingly turbulent world, universities have huge potential to engage with non-academic stakeholders to advance resilience of all kinds at multiple levels including strengthening individual resilience, community resilience, infrastructure resilience, and ecosystem resilience. Institutions of higher education hold a unique position in society as critically important places of knowledge production, analysis, and knowledge dissemination. Institutions of higher education have the unique potential to encourage synthesis and integration of different types of knowledge and to enhance the application of knowledge for social change. This session explores the potential for university initiatives focused on strengthening resilience. The Global Resilience Institute at Northeastern University, a leading a university-wide interdisciplinary effort to advance resilience-related initiatives that contribute to the security, sustainability, health and well-being of societies, provides an example of the potential of engaged academic work in this critically important area.

Speaker:

Jennie C Stephens, Associate Director, Global Resilience Institute, Dean's Professor of Sustainability Science and Policy, Northeastern University (organizer)

Vilas Mujumdar, Distinguished Senior Fellow, Global Resilience Institute, Northeastern University

Ruby Woodside, Innovative Services Manager, Second Nature

Meghan Chapple, Director of Office of Sustainability, George Washington University

S-A12 Hurricanes and Infrastructure – Building Resiliency for Extreme Weather Events

This symposia will discuss several topics important for understanding the hurricane and infrastructure nexus including the current state of knowledge about hurricane threats and current prediction skill, how public infrastructure-planning decisions are made and what information is required to support decision makers, best practices for educating the public and informing public policy to increase resilience, and risk based community resilience planning. The intent is to have a session that is informative to weather information users (e.g., urban planners,infrastructure designers) and information providers (e.g., researchers, National Weather Service, national laboratories, etc.) where both sides can articulate the state of the science, risk communication issues, and information needs of stakeholders.

Speakers:

Doug Hilderbrand, National Weather Service HQ, and Chair of the AMS Board on Enterprise Communication

William M. Lapenta, Director, National Centers for Environmental Prediction (NCEP), NOAA, National Weather Service

Leslie Chapman-Henderson, President and CEO, Federal Alliance for Safe Homes (FLASH)

Scott Smith, Coastal Resiliency Manager at City of Norfolk, VA; American Public Works Association (APWA)

Norma Jean Mattei, Professor, Department of Civil & Environmental Engineering,University of New Orleans (UNO) and Past President of the American Society of Civil Engineers

S-A13 Accessing Federal Funding to Support Infrastructure Development

TechVision21 will provide an interactive "class" on how to access Federal funding to support infrastructure demonstration and development. The Federal government has sources of funding that range from small grants of less than a million to multi-million dollar awards. TechVision21 will provide an overview of the Federal funding landscape, developing and executing a Federal funding strategy, and how to develop and write a competitive proposal. Participants can offer examples of their experiences in working to access Federal funding, or projects for which they may seek funding, and TechVision21 will offer "mini-consultations" in the form of observations and limited advice. Founded in 2001, TechVision21 is an award-winning business strategy firm that has helped clients secure over $70 million in direct Federal grant funding. www.techvision21.com

Speakers:

Hon Kelly H Carnes, President and CEO, TechVision21

Anita Balachandra, Senior Vice President, TechVision21

S-A14 Energy Efficiency Programs in Low-Income Communities

Energy efficiency, as opposed to energy conversation, usually involves an initial investment to reduce energy usage. This investment is typically cost prohibitive in communities already suffering from a significant energy burden. This symposium will identify the challenges and highlight successes associated with developing and implementing energy efficiency programs and their impact across a variety of low-income communities. An overview of the issue will be presented, followed by global, regional, state, and community level perspectives. Organizations that have succeeded in implementing energy efficiency in low-income communities by taking a systems approach will explain their methodology, the resources required, and the results. The aim of the symposium is to highlight the unique challenges and to inspire attendees to adopt a systems approach when working with low income communities.

Speakers:

Michele Putko, PE, Lecturer, Department of Mechanical Engineering, University of Massachusetts Lowell

Annie Gilleo, Senior Manager, State Policy, American Council for an Energy Efficient Economy (ACEEE)

Debbie Weyl, Manager, Building Efficiency Initiative, WRI Ross Center for Sustainable Cities, World Resources Institute

Patrick M. Cicero, Pennsylvania Utility Law Project

S-A15 Ecosystem Services Education: Engaging Diverse Audiences with EnviroAtlas

The benefits humans receive from nature, called ecosystem services, are influenced by natural, built, and social infrastructure. The EnviroAtlas, developed by the U.S. Environmental Protection Agency and partners, has a collection of web-based maps and information about these benefits. As an online tool, EnviroAtlas can be used for education and to make better decisions for building healthy communities. This session will introduce the audience to EnviroAtlas and give examples of educational materials related to the benefits humans receive from nature.

EnviroAtlas has two main tools: An Interactive Map with hundreds of maps across the U.S., and an Eco-Health Relationship Browser with results from hundreds of scientific publications on the connections between

ecosystems and their benefits to human health. Anyone can use EnviroAtlas with an internet browser and some introduction to the web-based tools.

This session will focus on education using EnviroAtlas for K-12, higher education, and beyond. The first part will show how K-12 education can combine online tools with outdoor experiences. We will hear from a K-12 teacher about her experiences testing three lessons in multiple classrooms. We will also hear from university professors about how education on nature's benefits can be used in higher-ed classes and research projects. Beyond higher education, EnviroAtlas can train professionals on the value of natural ecosystems.

EnviroAtlas can help us learn why nature's benefits should remain at the forefront of infrastructure preservation and new design considerations

Speakers:

Ferdouz V. Cochran, Oak Ridge Institute for Science and Education (ORISE) PostDoc - EnviroAtlas, US Environmental Protection Agency/NHEERL

Jenna M. Hartley, ASPPH Environmental Health Fellow Program Participant, hosted by the Office of Research & Development, U.S. Environmental Protection Agency

Anne Neale, Physical Scientist, EnviroAtlas Project Lead, US Environmental Protection Agency

Chris Jensen, Associate Professor, Pratt Institute

Brandon Costelloe-Kuehn, Lecturer, Rensselaer Polytechnic Institute

Genevieve Bennett, Senior Associate, Ecosystem Marketplace, Forest Trends

S-A16 Energy and Water Systems within the Urban Environment

The growth of cities is tied to the development of transportation, energy and water systems upon which city residents depend. With pressures created by land-use changes, population growth and climate change, these systems are increasingly stressed. Failures of water and electricity networks are marked by discharge of untreated sewage into surface waters and increasingly frequent brownouts and blackouts. This session will discuss the use of green infrastructure -- networks of natural and constructed wetlands, streams, and vegetation -- to reduce stresses on electrical and water systems while making the city more livable for its residents.

Speakers:

Yehuda Klein, Professor, Brooklyn College Department of Economics

Jennifer Cherrier, Professor, Brooklyn College Department of Earth and Environmental Sciences

Ozge Kaplan, Research Environmental Engineer, Office of Research and Development, US Environmental Protection Agency

Alan Cohn, Managing Director, Integrated Water Management, New York City Department of Environmental Protection

Kevin Lyons, Associate Professor and Chair, Department of Supply Chain Management, Rutgers Business School

Sarah J. Becker, Physical Scientist, Engineer Research and Development Center, US Army Corps of Engineers

Symposia B

TUESDAY, JANUARY 23
3:30 PM - 5:00 PM

S-B1 Building national Social Infrastructure to Support STEM Educators

K-12 STEM education is widely regarded as a pinch point on the pathway to a sustainable 21st century. Teachers are on the front lines of addressing this crisis. Little attention is devoted to their needs even though they are directly responsible for achieving the necessary results. K-12 STEM teachers need a social support system to do their job well. While we can provide them with up-to-date teaching tools, it takes more than 'cool stuff' to foster brilliant teaching and deep learning. Teachers must prepare themselves to teach content and skills they never learned when they were in school. One approach to addressing this need is to support the development of teacher communities. The American Modeling Teachers Association (AMTA) is one such community--a grassroots virtual community of 10,000 STEM educators who learn and work together, investing time and energy to advance their understanding and boost their students' thinking and learning. Their shared identity is as teachers who use a particularly effective teaching method: Modeling Instruction. Teachers own Modeling Instruction in a way that is unique among educational initiatives.

In this session we will describe the evolution of this community that emerged (by accident--not by design) from a 16-year NSF-funded project that ended in 2005. We will explore the forces that shaped its agenda, the many ways in which it shows up in different parts of the country, the regional affiliates it has 'birthed'--STEMteachersPHX, STEMteachersNYC, STEMteachersHOU, STEMteachersDFW, STEMteachersMassBay--and the challenges with which this teacher group and its affiliates continue to grapple.

Speakers:

Colleen Megowan-Romanowicz, Senior Fellow, American Modeling Teachers Association

David Hestenes, Professor Emeritus, Arizona State University

Fernand Brunschwig, President, STEMteachersNYC

Michael Gallagher, Science Education Consultant, Oakland Schools

S-B2 Artists as Partners in Infrastructure Education

In order to transition to a sustainable future, we need to imagine beyond the way we see things today. Much of the public does not even think about infrastructure, taking it for granted. It is invisible. Artists can and have opened up new ways of seeing and interacting with the public as well as infrastructure professionals. This Symposium, gathers artists and professionals in infrastructure to present innovative projects and discuss the challenges of engaging the public in in an area often seen as backstage material for our lives, if seen at all. The group will discuss the role of interdisciplinary teams, including artists in imagining a new story for our interface with the natural world and the services it provides.

Speakers:

Jonee Kulman Brigham, Fellow, Institute on the Environment, University of Minnesota; Artist, Owner, Full Spring Studio (Moderator)

Shanai Matteson, Artist & Collaborative Director, Works Progress

Arlene Birt, Visual Storyteller, Background Stories; Associate Professor, Minneapolis College of Art and Design

Cathy Abene, Principal Civil Engineer, University of Minnesota

Anna Eleria, Planning, Projects & Grants Division Manager, Capitol Region Watershed District

S-B3 USGS Support of Coastal Community Sustainability and Resiliency

Throughout human history, coastal areas have been attractive locales for humans as they provided abundant marine resources, fertile agricultural land and possibilities for trade and transport. However, many coastal areas are vulnerable to numerous hazards, including flooding, tsunamis and hurricanes. If a community wishes to be able to respond to any of these events, it requires studies identifying which areas are vulnerable and any possible actions limiting their impact. The US Geological Survey (USGS) helps communities by mapping coastal conditions, researching vulnerabilities and identifying possible actions limiting loss of life and property.

Speakers:

Jonathan H Smith, Land Change Science Program Coordinator, US Geological Survey

Dean Gesch, US Geological Survey

Roger Sayre, ecosystems geographer, US Geological Survey

Dianna Hogan, Supervisory Physical Scientist, US Geological Survey

Zhiliang Zhu, Chief, USGS Biologic Carbon Sequestration Program, US Geological Survey

S-B4 Testing Resilience Policy: What Science is Needed to Define Best Practice, Assess Outcomes, and Anticipate Resilience Change

Addressing today's science infrastructure needs (research, monitoring, decision-support interpretation and information access) is critical to the NCSE goals to "achieve the Nation's sustainability goals, demonstrate low and zero carbon development, mitigate human impact on the environment, and advance a strong, stable economy." This session will engage the policy and science communities in a discussion of possible science and policy frameworks, and resilience measurements for assessing and tracking change in environmental and socio-economic resilience. What science is needed to support the challenging policy and management decisions of the next decade? How should an information base be established and shared? Speakers will briefly address these topics and encourage discussion of the most pressing issues at the science, resilience, and policy interface.

Speakers:

Lynn Scarlett, Former Deputy Secretary, Dept. of the Interior (2005-09); current Co-Chief External Affairs Officer, The Nature Conservancy

Rick Bennett, Regional Scientist, Northeast Region, US Fish and Wildlife Service, and Chair, Federal/State/NGO Natural Infrastructure Metrics Working Group

Susan Taylor, Senior Associate, Abt associates; Lead Author of the DOI Socio-Economic Metrics Report, 2015

Peter Murdoch, Science Advisor, Northeast Region, US Geological Survey; Co-Chair and Lead Author for the DOI Coastal Resilience Metrics Report, 2015

S-B5 Green infrastructure in Mexico: Valuing Ecosystem Services

In this session, we look to show the advances, challenges and opportunities in Mexico to value ecosystem services in order to help Green infrastructure conservation and restoration. Four panelists, two come from the Academy, one from the government (Environmental and Natural Resources Secretary) and one from a Mexican NGO (Jacobea Foundation) will show the big opportunities that exist in this field in Mexico. They will talk about Cultural Ecosystem Services and Tourism in Natural Protected Areas and about blue carbon and mangroves ecosystem services. They will present the proposal "Paying for ecosystem services in the Sistema Lagunar de Alvarado", a big and rich ecosystem, pushed into a huge economic and social pressure, located in the coastal region of the Gulf of Mexico. They will show some of the main programs that aim to pay for ecosystem services in Mexico, explaining the advantages and disadvantages of each, emphasizing aspects that need to change within the basis of the principle the beneficiary pays.

Speakers:

Tania Garcia, University of Veracruz

Ana Karen Ricano, IA, Fundacion Jacobea

Isis Arlene Díaz-Carrión, Universidad Autónoma de Baja California

Gloria Cuevas Guillaumin, SEMARNAT Secretary of Environment

S-B6 Developing a Business Case for Investing in Water Resilience

Freshwater resources often cross jurisdictional boundaries and can suffer from a "tragedy of the commons". Many smaller entities take fresh water access for granted and are not financially prepared for disruptions and the insurance industry is largely absent from this sector. Water sector risk management is mostly focused on constructing new infrastructure to access more water supply and reducing risk to that infrastructure. However, when water sector disruptions occur --whether due to supply or distribution systems, both businesses and human health suffer, and are further strained the longer the duration of the disruption. Making investments in resilience and building resilience practices are important to manage disruptions and recovery, especially in areas already stressed by degraded infrastructure or projected climate change, including both drought and excessive precipitation. It it critical to establish the business case for water sector resilience in order to incentivize early investment in resilience to prevent major humanitarian and economic disasters in the future.

Speakers:

Cate Fox-Lent, U.S. Army Engineer Research and Development Center (moderator)

Ilker Adiguzel, Director, Environmental Laboratory, US Army Corps of Engineers Engineer Research and Development Center

Igor Linkov, US Army Corps of Engineers' Research and Development Center

Jim Gebhardt, Director, Water Infrastructure and Resiliency Finance Center US EPA

Peter Sousounis, Assistant Vice President and Director of Meteorology, AIR Worldwide

S-B7 Green Infrastructure and Resilience – A Win-Win Strategy

Communities face serious risks from rising sea levels, storm surges, and changing precipitation patterns. One potential resilience solution is the use of nature-based approaches. Ecosystems provide valuable services that help to build resilience and reduce the vulnerability of people, livelihoods, and infrastructure to climate change impacts while at the same time providing environmental and other benefits. Nature-based features (often referred to as green infrastructure) can help increase resilience when used alone or in combination with traditional protective or "gray infrastructure" measures. Coastal nature-based solutions include dunes, wetlands, living shorelines, oyster reefs, beaches, and artificial reefs. These features can protect coastal communities from the brunt of storm surges and open water waves. Some can adapt to sea level rise by accreting sediment or migrating inland. Inland green infrastructure projects can help manage stormwater runoff by increasing on-site storage and slowing the release of water into the sewer system. These strategies can include greenroofs, bioswales, rain gardens, and permeable paving. More communities are looking into how they can use green infrastructure solutions as an alternative to, or in addition to, traditional hard infrastructure to protect their communities from flooding. This session will explain how public agencies from diverse sectors can integrate green infrastructure into their projects.

Speakers:

Brenda Dix, ICF, Climate Adaptation and Resilience

Tina Hodges, Federal Highway Administration

Bari Greenfeld, US Army Corps of Engineers

LaTonya Gilliam, Delaware Department of Transportation

Alan Cohn, New York City Department of Environmental Protection

S-B8 Grid Security, Coal and Sustainable Post-Mining Land and Water Use in the Appalachian Coal Mining Region of the USA

For the US electrical grid to be secure, resilient and reliable, many sources of energy must be and are included, such as natural gas, oil, hydroelectric, nuclear, coal, wind, and solar. Each of these sources play a role in base load and/or peak operations to supply energy to the grid. While natural gas power plants have increased due to a number of factors, including cost and environmental concerns, other sources of energy will continue to be required for reliability and resiliency. Multiple sources are required, in part, due to disruptions caused by extreme weather events. Since coal is one of the few energy sources that can be stockpiled on site, it serves a grid reliability and resiliency function. Therefore, coal mining will continue and the reclamation of the minded lands; including the soils, water and ecosystem, will be issues that are addressed by the mining sector and regulatory agencies. This session will present the issues and foster discussions on effective planning and implementation of reclamation and water management practices, which will inform the development of energy resources and restoration of disturbed lands to support a variety of post-mining economic and environmental needs. Sustainable, post-mining land uses include 1) agriculture including prime farmland with crops, hay land and pasture, and biofuel crops; 2) forestry; 3) wildlife habitat; and 4) developed land uses. Associated water uses include 1) freshwater fisheries, 2) aquaculture and agriculture, 3) domestic and industrial supplies, 4) geothermal, and 5) mineral or metal resource recovery.

Speakers:

Gwendelyn Geidel, Research Professor, School of the Earth, Ocean and Environment, University of South Carolina

Jeff Skousen, Professor of Soil Science and Reclamation Specialist, West Virginia University,

Charles A. Cravotta, III, Research Hydrologist/Geochemist, US Geological Survey

SYMPOSIA OVERVIEW

S-B9 Connecting Green Infrastructure and Ecosystem Service Frameworks for Resilience and Sustainability in the Built Environment

This session is a conversation among people who study the sustainability of cities. Each comes from a different field - ecologists, physical scientists, planners, and social scientists. They will talk about how their field and their own work looks at the integration of cities and nature. This integration is often looked at to provide benefits to people (protection from floods, shading the sun, habitat for animals, gardens, parks, etc.). However, this integration is often thought about without considering other aspects of what makes cities work (buildings, infrastructure, people, etc.). The speakers in this session will also bring ideas about how to connect ecological perspectives on cities with more traditionally urban topics. It is our hope that by having this conversation with several different perspectives we will be able to identify new ways to study cities, as well as new ways to plan and manage cities so that they function better for both people and nature.

Speakers:

Mitchell Pavao-Zuckerman, Department of Environmental Science and Technology, University of Maryland, College Park

Marissa Matsler, Cary Institute for Ecosystem Studies

Jack Ahern, Professor of Landscape Architecture, University of Massachusetts, Amherst

Zbigniew Grabowski, Portland State University

S-B10 A Participatory Infrastructure Assessment Technique: Towards Equitable, Sustainable, and Resilient Communities

A participatory infrastructure assessment technique can be used by local residents to evaluate neighborhood stormwater drainage. Participatory infrastructure assessment involves the formal training of students, citizens, and fellow community members in scientifically determining the quality and condition of neighborhood features to inform maintenance and rehabilitation. It also involves utilizing local knowledge to inform future capital planning. Through outdoor surveying and a series of pass or fail performance statements, this technique explores the process of assessing neighborhood-level stormwater infrastructure to determine these features' contribution to localized flooding and more large-scale inundation. Understanding the condition and capacity of stormwater infrastructure allows for the estimation of levels of service and local systems ability to manage stormwater and effectively and efficiently mitigate hazard exposures. This method may be especially beneficial to marginalized, blighted and declining areas and neighborhoods that have been subjected to structural disinvestment and neglect.

Speakers:

John T. Cooper, Jr., Vice President of Public Partnerships and Outreach, Texas A&M University (Moderator)

Yvette Arellano, Research and Policy Liaison, Texas Environmental Justice Advocacy Services (t.e.j.a.s.), Houston, Texas

Marccus D. Hendricks, Assistant Professor of Urban Studies and Planning and Faculty Research Associate, Center for Disaster Resilience, University of Maryland

Galen Newman, Associate Professor of Landscape Architecture and Community Resilience Lead, Institute for Sustainable Communities, Texas A&M University

Shannon Van Zandt, Professor of Urban Planning and Department Head of Landscape Architecture and Urban Planning, Hazard Reduction and Recovery Center, Texas A&M University

S-B11 Interdisciplinary Approaches to Advanced Water Resilience in the Clackamas Watershed

Just outside Portland, OR, the Clackamas river flows from the top of Mt. Hood, through forest land, alongside farms, and into Portland's suburbs. The river provides recreation, irrigation, drinking water to over 300,000 customers, and more. Clackamas River Water Providers, a consortium of water providers who pull from the Clackamas River; and Clackamas River Water Environmental Services, the wastewater and watershed protection agency in the area, want to plan for the effects of climate change on the Clackamas River. These stakeholders are working with an interdisciplinary team from Portland State University to help understand how water quality and quantity may change in the future.

Like other areas of the Pacific Northwest, the Clackamas river is projected to have increases in winter flow and decreases in summer flow, increasing air temperatures, decreasing snow-pack, and dryer, longer summers. It's already known that this will have some negative impact on water resources, water quality, water-dependent industries, and ecosystems. The Clackamas Watershed Resilience project aims to provide a more comprehensive and detailed picture of the future of the watershed by focusing on this specific geography and increasing their understanding of how a variety of climate change risks/possible events are linked to the water quality and quantity in the region. The team includes specialists in hydrology, meteorology, geology, fire ecology and social science who are looking at how large-scale storms, rain on snow events, drought, and fire have historically effected the watershed.

Speakers:

Paul Loikith, Assistant Professor of Geography & Climate Science Lab Director, Portland State University

Junjie Chen, Graduate Student pursuing MS in Geography, Portland State University

Matt Glazewski, Public Policy Analyst-Water Environment Services, Clackamas County

Beth Gilden, Project Manager,Institute for Sustainable Solutions, Portland State University

S-B12 Practicing Design Thinking: Case Studies from Asia and Africa on Governance, Disaster Mitigation, and Sustainable Agriculture

"Integration," "collaboration," "interdisciplinarity," and "convergence" are all really big words and sometimes called "buzzwords." They basically mean that people have to work together to fix things or make things. People who may not normally work together really should when they do things that have to do with where we live and the world around us. This session uses stories from far, far away: from Asia to Africa and explains how people, communities, governments, doctors, farmers, religious leaders and media have all worked together using the same ideas that engineers use to build things, like a bicycle. When you pedal your bike, it moves a chain that moves wheels. This is a system. The stories that the two doctoral students will tell are stories that they know a lot about and are about systems. They will explain how when things are designed like a bicycle with connected parts, they can be used to get citizens involved in government; to understand how water, food, and agriculture are connected; and how health clinics can be built that puts people at the center of the design. By the end of the session people will understand not only what the big words mean but how to use them and make them work.

Speakers:

Susan Howard, Doctoral Student & International Development Practitioner, George Mason University, College of Science, Environmental Science & Policy Department

Syed Mustafa Hassan, Doctoral Student & Practicing Engineer/Instructional Designer, George Mason University, College of Education and Human Development

Anton Schneider, Senior Behavior Change Advisor, USAID

S-B13 Climate Changes Health: Justice, Equity, Mitigation, and Activism

Climate change is the greatest danger to human health. Warmer weather, an increased number of dangerous storms, and dirty air are making us sicker. We all deserve to be healthy, but climate change threatens that. While it can make everyone sick, climate change makes some of us sicker than others. Kids, older people, and neighborhoods with people of color or poor people have higher risk. These communities may not have the power to make decisions to prevent or prepare for climate change. Climate solutions must protect everyone, including these groups. Clean energy is one way to reduce climate change. It includes using energy from the wind and sun. It is healthier and saves money. Scientists agree that climate change is unhealthy. However, it is hard to take action that truly makes a difference. If we bring groups together to address climate change, we can have a bigger impact. Together, we can make a difference. Participants will better understand who is most vulnerable to climate change. They will also learn about opportunities in clean energy. Lastly, they will learn how partners can help.

Speakers:

Natasha DeJarnett, American Public Health Association

Surili Sutaria Patel, Deputy Director, Center for Public Health Policy, American Public Health Association

Irena Gorski, Johns Hopkins University

S-B14 Community Resilience: Disasters, Development and Building with Nature

Disasters such as floods and earthquakes cause both loss of life and damage to the natural infrastructure upon which societies depend for their well-being. Protracted emergencies due to complex political instabilities and kinetic conflict, compounded with slow onset shocks like droughts, further weaken response and recovery. Evidence has increasingly shown that taking into account the resilience of nature before and after humanitarian action improves lives and livelihoods. This approach is particularly true in developing world economies where governance capacity is weakened by recurring climatic and geohazard shocks. Similarly, nature-based approaches to climate change adaptation -- an idea known as "ecosystem-based adaptation" (EbA) -- is gaining increased attention from development institutions, governments, and local communities.

This symposium will highlight the role of nature in humanitarian and development programming in the face of disasters. We discuss challenges and opportunities in identifying key intervention points within the humanitarian and development program cycles to to employ nature-based assessment tools and ecosystem-based adaptation.We will highlight in-country examples and key findings from the Coordination of Assessments for Environment in Humanitarian Action and USAID's ecosystem-based adaptation evidence summaries and case studies.

Speakers:

Jennifer Kane, Biodiversity and Natural Resources Specialist E3 Bureau/Forestry and Biodiversity Office, U.S. Agency for International Development (USAID)

Erika Clesceri, DCHA Bureau Environmental Officer (BEO), Bureau for Democracy, Conflict and Humanitarian Assistance, U.S. Agency for International Development (USAID)

Anita van Breda, Senior Director, Environment and Disaster Management, World Wildlife Fund

Ali Raza, Programme Manager, Ecosystem Based Adaptation, International Union for Conservation of Nature (IUCN)

Anne Koontz, Relief International

Symposia C

WEDNESDAY, JANUARY 24
11:00 AM - 12:30 PM

S-C1 Scaling Up Renewables in Higher Ed to Curb Climate Change

Renewable energy from wind farms and solar parks are helping campuses reduce their contributions to climate change. Learn how two campuses built solar arrays on their campus rooftops, and also found a way to get huge solar parks built that green the power feeding their regional electricity grids. Their examples are serving as models for many more campuses to help America transition away from polluting sources of energy to clean, renewable energy, thus helping in the effort to reduce the impacts of catastrophic climate change.

Speakers:

Chris O'Brien, Director, Higher Education Programs, Edison Energy

Rob Andrejewski, Director of Sustainability, University of Richmond

S-C2 Integrating the Built and Natural Environments for Human and Environmental Health: What Building Rating Systems Can Teach Us

Most building construction does not consider the health of people and the surrounding environment in building design. As the global human population grows, we need to design sustainable buildings that are closely tied to nature to improve human and environmental health. Five building rating systems: 1) Living Building Challenge (LBC), 2) U.S. Green Building Council LEED (Leadership in Energy and Environmental Design), 3) Net-Zero Energy, 4) Sustainable SITES certification, and 5) WELL Building certification, all provide guidance to designing efficient, sustainable buildings that prioritize human and environmental health. Additionally, research has shown that exposure to nature improves our mental and physical health and pro-environmental behaviors. Biophilic design can strengthen our connections to nature in the built environment, benefiting the spaces in which humans live, work, play and learn. Phipps Conservatory's Center for Sustainable Landscapes in Pittsburgh, PA, will serve as a case study for using building rating systems and biophilic design to maximize organizational goals, efficiency, and human and environmental health. An interactive session will guide participants in defining their sustainability goals and selecting building rating systems to achieve them. We will make the case why and how rating systems, and making connections to nature, can help us achieve the highest level of sustainability in a cost-effective manner, while enriching human health and protecting and restoring the environment.

Speakers:

Richard V. Piacentini, Executive Director, Phipps Conservatory and Botanical Gardens

Sarah L States, Director of Research and Science Education, Phipps Conservatory and Botanical Gardens

Sonja Bochart, IIDA, LEED AP BD&C, WELL AP., Principal, Shepley Bulfinch

S-C3 Bringing Climate and Weather Impacts Knowledge to Infrastructure Problems: NOAA's RISA Program

The NOAA Regional Integrated Sciences and Assessments (RISA) program supports eleven research-engagement teams across the U.S. to help decision makers build their expertise to plan and prepare more effectively for climate variability and extreme weather events. A number of those decision makers are urban planners, city officials, water managers and others tasked with managing stormwater runoff, transportation systems, electric and water utilities, ports, commercial development, and overall city or town planning. In addition to an overview of the RISA program's efforts to support decision making for infrastructure-focused projects and areas for future expansion, the session will include work from four of the RISA teams based in the Mid-Atlantic, the urban Northeast corridor (Boston-New York-Philadelphia), urban and rural areas of Nevada, eastern California, and Arizona.

Speakers:

Caitlin Simpson, RISA Program Director, NOAA Climate Program Office,

Ben McMahan, University of Arizona and CLIMAS RISA, Research, Outreach, and Assessment Specialist

Tamara Wall, Western Regional Climate Center and California Nevada Applications Program (CNAP) NOAA RISA Team, Deputy Director and Co-PI

Neil Berg, RAND and MARISA RISA, Program Manager and Associate Physical Scientist

Dan Bader, Columbia University and CCRUN RISA, Program Manager

S-C4 Weathering the Storm: Integrating Climate Risks into Infrastructure Financing

The impacts of a changing climate are already placing added stress on critical infrastructure, as we have recently seen during severe weather events affecting several populous and economically important coastal cities in the US (Houston, Miami, Tampa), as well as in heavily populated areas around the world (Bangladesh; Mumbai, India). Safeguarding communities' physical and economic well-being will require improving the climate resilience of existing and new infrastructure. Financing an infrastructure project is often complicated and involves a number of different types of financial sources. Many infrastructure projects are public-private partnerships, with funding from governments and municipalities as well as from banks and funds that specialize in financing infrastructure.

This session explores how infrastructure banks and other investors can begin to integrate climate risks into their infrastructure investment decision-making to ensure that those investments are more physically and financially resilient. Presenters will discuss: The challenges and opportunities of integrating climate risks into infrastructure investments, including the role of data and analytics, standards, and policies at national, state, and local levels. Why it is in the best interest of investors to enable resilience within their infrastructure investments, and thus enable transformative adaptation in the infrastructure sector, and practical application of approaches to integrate climate risk considerations, as well as needed next steps.

Speakers:

Yoon Kim, Four Twenty Seven, Director of Advisory Services

Stacy Swann, Climate Finance Advisors, Founding Partner and CEO

Lisa Dickson, Director of Resilience for the Americas, ARUP

Samantha Medlock, Head of North America Capital, Science & Policy, Willis Towers Watson

Alan Miller, Climate Policy and Finance Expert

S-C5 Encouraging Stormwater Green Infrastructure Implementation: Engagement, Experience, and Economics

This session will explore strategies that encourage or incentivize implementation of green infrastructure. Green infrastructure includes stormwater management practices that allow rainwater to soak into the ground close to where it falls. The Great Lakes Green Infrastructure Champions Pilot Program catalyzes the adoption of green infrastructure practices across the Great Lakes region by bringing together green infrastructure leaders and helping them share their knowledge. We will talk about how to encourage property owners to put in green practices to help control rainwater from washing pollution and dirt off of their property. We will talk about the science behind these green practices, how to explain the science surrounding these practices to people, and why people should know about them. We will show how communities can learn from one another about how to use these practices. We will show how to use Rainwater Rewards - an online and mobile friendly stormwater calculator that shows the value of green infrastructure investments in small- to medium-sized cities in the Great Lakes Basin.

Speakers:

Elaine Sterrett Isely, Director of Water Programs, West Michigan Environmental Action Council (WMEAC)

Erik Nordman, Associate Professor, Grand Valley State University

Emily Therese Cloyd, Project Director, Public Engagement, American Association for the Advancement of Science (AAAS)

Don D. Carpenter, PE, LEED AP, Principal, Drummond Carpenter

S-C6 Environmental Impact Bonds and Sustainable Infrastructure: Accelerating the Deployment of Resilience Investments Across U.S. Cities

While municipal bonds have helped animate the growth of the United States for the past 200 years, critical urban infrastructure across the United States has fallen into disrepair, and traditional finance approaches for improvements have struggled to keep up. On top of this backlog, we also need to enhance the resilience of our infrastructure to prepare cities for growing physical, environmental, and economic challenges. This panel will introduce a new financing tool called the Environmental Impact Bond, launched first by DC Water and Quantified Ventures in 2016 and now being replicated in U.S. cities in 2018. Hear from city and utility executives exploring this type of financing for managing stormwater, building green infrastructure, and investing in resilience. We'll also introduce investors and philanthropists playing a role in this new movement.

Topics covered include: stormwater management, green infrastructure, new jobs and green spaces for communities, impact investing, financing tools, philanthropy

Speakers:

Ben Cohen, Senior Associate, Quantified Ventures (moderator)

Lee Epstein, Lands Program Director and Special Counsel, Chesapeake Bay Foundation

Bethany Bezak, Green Infrastructure Manager, DC Water

Kevin Bush, Chief Resilience Officer of Washington, D.C.

Mark Cameron, Section Chief, Watershed Planning + Partnerships, Office of Compliance and Laboratories / Department of Public Works, Baltimore (invited)

S-C7 Designing Urban Resilience beyond the Science: The Project of the Future

As Hurricane Irma recently confirmed, South Florida is one of the most hurricane prone regions in the world. During Hurricane Irma, 6 million people were required to evacuate South Florida under the threat of storm hazards with a large proportion of this population lacking the resources to recover from resulting loss of property and income. Climate change will continue to exacerbate the natural hazards global regions are already confronting. If we assume the science is set, the question remains- what are we going to do about it? "Designing Urban Resilience after the Science: The Project of the Future" will present models for visioning the resilient future of cities as regions around the world are reevaluating their natural, built, cyber and social infrastructure in response to the risks and vulnerabilities associated with climate change. An interdisciplinary panel who believe in a prosperous future for the region and are imagining how to create it will gather together to discuss how we are daring to think big about urban resilience for South Florida by engaging in infrastructural thinking at multiple scales inclusive of natural, built, and social dimensions.

Speakers:

Nancy Clark, Director, University of Florida Center for Hydro-generated Urbanism; Associate Professor College of Design Construction and Planning

Matt Haggman, Miami Program Director, Knight Foundation 2011-2017

Alex Kaplan, Head, North America, Senior Vice President Global Partnerships, Swiss Re Management Corporation

Zelalem Adefris, Climate Resilience Program Manager, Catalyst Miami

S-C8 The Food, Energy, Water (FEW) Nexus – Addressing Aspects of Assessment and Transformation

Climate change, population growth and resource shortages will increasingly endanger the basic human needs: adequate food, safe and sufficient freshwater, and affordable and clean energy. Understanding the interlinkages between food, energy and water (FEW) resources and their infrastructures will become extremely important in order to effectively manage the supply of the FEW nexus resources especially in growing urban areas. Currently, often different authorities are responsible for the different sectors, e.g., agriculture, energy, or water. The process of decision-making in the urban FEW nexus is thus highly fragmented and complex.

Furthermore, especially in industrialized economies, the resource infrastructure is directly linked to a network of further infrastructures (e.g., information and communication infrastructures). Given this complexity and the diverse challenges, the focus in this session will be set on the dynamics of the decision-making landscapes involved in the urban FEW nexus including questions of governance and institutions, as well as the integrated assessment of the food-energy-water nexus both with respect to the natural resources and the socio-economic systems.

Speakers:

Holger Schlör, Forschungszentrum Jülich Institute of Energy and Climate Research IEK-STE: Systems Analysis and Technology Evaluation

Sandra Venghaus, Institute of Energy and Climate Research, Forschungszentrum Jülich, Jülich, Germany

Jürgen-Friedrich Hake, Professor, Institute of Energy and Climate Research (IEK-STE), Forschungszentrum Jülich, Jülich, Germany: An integrated assessment model for the food-energy-water nexus

Jürgen-Friedrich Hake, Sandra Venghaus, Carolin Märker, IEK-STE, Forschungszentrum Jülich, Jülich, Germany: Governance of the food, energy, water nexus in the urban context – an application of the management and transition framework to the city of Cologne, Germany

S-C9 Building Resilience through the Climate Science and Social Equity Nexus

This panel will bring perspectives on increasing resilience by strengthening the social, built (residential and commercial buildings and the electric grid) and natural infrastructure. Major recent disasters like Harvey and Irma call for robust federal leadership and significant resources that are equitably distributed and prioritized on pre-disaster preventive measures. Given all these vast challenges posed by a changing climate, our nation's responses must be robust. We need to phase-out current maladaptive policies and measures that perpetuate risky coastal development. We should increase resilience by using existing policy frameworks such as the National Flood Insurance Program, and reinstating the Federal Flood Risk Management Standard. Congress and the Administration should scale up funding for pre-disaster preventive measures. Finally, we must create and fund new policies and measures that respond to the full extent of the challenges communities will face.

Speakers:

Damien Jones, Environmental Justice Outreach Advocate, Climate & Energy, The Union of Concerned Scientists (moderator)

Ryan Colker, Director, Consultative Council/Presidential Advisor for the National Institute of Building Sciences

Alice Hill, Research Fellow, The Hoover Institute, Stanford University

Rachel Cleetus, Lead Economist, The Union of Concerned Scientists

Julie McNamara, Energy Analyst, The Union of Concerned Scientists

S-C10 Case Studies of Employing Model Based Reasoning to Improve Transdisciplinary Collaboration Competencies

The ability to work in a team synthesizing data, information, and perspectives across diverse disciplinary and professional divides is at the heart of meeting sustainability challenges. The National Research Council (2015) report on enhancing the effectiveness of team science called for better understanding of how to achieve such outcomes. Among the seven key challenges are difficulties achieving deep knowledge integration across the boundaries of respective disciplines, enabling team members to combine their unique knowledge and skills to address a shared research problem. Similarly, research on environmental science education programs has identified integration across disciplines as a major ongoing challenge. Despite continuing rapid growth in environmental-related undergraduate and graduate programs many, if not most, programs are functionally multidisciplinary (not interdisciplinary). Program leaders struggle to design tasks that lead to knowledge integration across disciplines (Vincent et al. 2015). Innovative approaches to leading and managing knowledge integration are needed, and these approaches need to be embedded in student education.

This symposium will describe and illustrate an emerging approach for how to better integrate knowledge across disciplines (Pennington et al. 2016) that employs experiential learning combined with model based reasoning. This approach is based on theories of how people learn and reason during complex problem solving. Four case studies in diverse contexts will be presented by faculty who have developed and tested the approach:

- Intensive, ten-day summer training workshop for PhD students on water resources;
- Semester-long undergraduate environmental studies class on food systems;
- Professional workshop for a management unit of the science-resource management interface;
- Graduate student workshop to develop an idealized, interdisciplinary first year course on sustainability and community resilience.

Speakers:

Deana D. Pennington, Associate Professor, Department of Geological Sciences, University of Texas at El Paso

Shirley Vincent, Principal and Owner, Vincent Evaluation Consulting, LLC

David Gosselin, Director of Environmental Studies, University of Nebraska at Lincoln

Rod Parnell, Professor, School Earth Sciences & Environmental Sustainability, Northern Arizona University

Geoffrey Habron, Professor of Earth and Environmental Science, Furman University

S-C11 From Provision to Use: Closing the Gap in Climate Resilience for Critical Infrastructure

People around the world rely on an interconnected infrastructure system for critical services, such as clean drinking water, reliable electricity, and access to healthcare. To provide the intended service, long-lived infrastructure must be resilient to changing climate conditions over the coming decades. This session will highlight efforts to improve the resilience of infrastructure, driven by organizations that rely on the service, as well as those providing it. Some water utilities in the US are implementing a range of techniques to help them better understand and manage their risks, like increasing water supply variability or disruptions in service. Energy utilities like Pacific Gas & Electric are working to integrate climate resilience across their business—from assets to operations to planning—and supporting the resilience of the communities they serve. Internationally, where a torrent of investment in power infrastructure is proceeding, Integrated Resource Resilience Planning (IRRP) in Tanzania and Ghana represent the frontier in connecting information about future climate risks, to improve longer-term power planning and to enhance power system resilience. Local communities, which are dependent on the critical infrastructure, are taking proactive approaches. New York City released design standards to increase the resilience of city buildings and infrastructure. Panelists will provide unique experiences to serve as the foundation for an interactive dialogue with all participants, exploring new insights in practical, powerful approaches for achieving resilience in critical infrastructure.

Speakers:

Judsen Bruzgul, Ph.D., Domestic Energy Resilience Lead, ICF (Moderator)

Molly Hellmuth, PhD, International Energy Resilience Lead, ICF

Kit Batten, Corporate Sustainability, Climate Resilience Chief, Pacific Gas and Electric Company

Alan Cohn, Managing Director, Integrated Water Management, New York City Department of Environmental Protection

S-C12 Communities and Scientists Working Together: Co-Designing Decision-Relevant Science

Community science is when scientists and members of local communities work together to use science to advance one or more community priorities. It's a way of doing science that prioritizes community impact over publishable results. Successful community science requires skills and approaches that are not often emphasized or rewarded in traditional science research or education. This session will introduce the AGU Thriving Earth Exchange (TEX) and the community science projects we support to address local climate change, natural hazards and natural resources challenges. It will feature insights and lessons learned from successful projects that attendees could use to advance community science in their own work.

Speakers:

Melissa Goodwin, Project Manager, Thriving Earth Exchange, American Geophysical Union

Raj Pandya, Director, Thriving Earth Exchange, American Geophysical Union

Laura Allen, Town Administrator, Town of Berlin, MD (Berlin, MD TEX Project)

Akua Asa-Awuku, Associate Professor, Chemical and Nuclear Engineering, University of Maryland – College Park (Brandywine, MD TEX Project)

Juan Declet-Barreto, Climate Scientist, Union of Concerned Scientists (Washington, DC TEX Project)

Kamita Gray, President, BTB Coalition (Brandywine, MD TEX Project)

S-C13 The Next Generation of Sustainable Urban Systems (SUS) Science

Urban areas are concentrated sites of population, innovation, wealth, and resource use where multiple infrastructures—natural, built, cyber, and social—converge. The transboundary nature of urban infrastructure networks, along with the massive scale and pace of urbanization is now affecting the wellbeing of people and the environment both within and far beyond urban administrative boundaries. Assessing the multi-scale relationships and interactions among infrastructures—natural, built, cyber, and social—that shape multiple sustainability outcomes is the core of sustainable urban system (SUS) science.

Traditional disciplines do not have the multi-scale systems approach, tools and data to address the multi-level and multi-objective complexity of diverse sustainability concerns regarding environment, health, and equity from local to global scales. Thus, there is an urgent need for a transdisciplinary science that generates new knowledge across traditional disciplines, advancing our understanding of the urban sustainability challenge and informing potential solutions.

This session features members of the US National Science Foundation's Advisory Committee on Environmental Research and Education (ACERE) SUS sub-committee who will present a scan of first generation efforts in developing trans-disciplinary SUS science. It will then articulate a vision of where this science needs to go in the future, delineating key elements of the next generation SUS research agenda. The work being discussed in the session is the product of the ACERE members. Any opinions, findings, conclusions, or recommendations expressed are those of the Advisory Committee and do not necessarily reflect the views of the National Science Foundation.

Speakers:

Anu Ramaswami, Charles M. Denny Jr., Chair of Science, Technology, & Public Policy, Hubert H. Humphrey School of Public Affairs, Department of Bioproducts & Biosystems Engineering, University of Minnesota

Luis Bettencourt, Pritzker Director of the Mansueto Institute for Urban Innovation, University of Chicago.

Elena Irwin, Professor, Environmental and Urban Economist, The Ohio State University

Stephanie Pincetl, Professor-in-Residence at the UCLA Institute of the Environment and Sustainability and Director of the California Center for Sustainable Communities at UCLA

Andres Clarens, Associate Professor, Civil and Environmental Engineering, University of Virginia

Diane Pataki, Professor, Biology, University of Utah

S-C14 Achieving an Integrated Surface Transportation System for All Users

The FHWA Office of Planning, Environment, and Realty will share research and program activities that are responding to the demand for accelerating project delivery while protecting the environment. In addition the environmental decision making process is adapting to address disruptive technology, innovative financing, and increased expectations for multimodal solutions, community revitalization and economic development in both rural and urban contexts. A dialogue with environmental science academics and students will reveal a range of research sharing, research needs, education and training opportunities to build individual and institutional capacity in the country to respond to current challenges.

Speakers:

Shari Schaftlein, Director, Office of Human Environment, Federal Highway Administration (moderator)

Dan Goodman, Livability Team, Office of Human Environment, Federal Highway Administration

Gary A. Jensen, Livability Team Leader, Office of Human Environment, Federal Highway Administration

S-C15 Multi-Species Buildings & Infrastructure

Anthropocentric built environments are destroying native ecosystems at an alarming rate. The need for continual growth is unavoidable, especially in the face of human relocation due to climate change. However, there are techniques that can be applied to reduce impact. While preserving land is important, it is not enough to offset the rate of growth, and only increases the disconnect between humans and nature. A new design strategy that allows us to coexist and create environments that meet the needs of multiple species is the next design revolution.

Speakers:

Jessica Rebecca Hernreich, Executive Director, Ecosa Institute for Ecological Design

Michael Ben-Eli, Founder, Sustainability Lab

Walt Anderson, GEOLOBO, Ecologist

Alan Francis, DB Interactive Inc., Building Systems Scientist

Betsy Maddox, DIRTT Environmental Solution, Interior Architect

S-C16 Perspectives in Sustainable Resilience: Integrating Earth Observation Data into Community-Level Processes

This symposium will provide scenarios that highlight the linkages among using Earth observation data to measure, monitor, and evaluate environmental change and the global network of actors that rely on these data for building and sustaining resilient communities. Understanding that environmental change affects governments, populations, and economies, this symposium will explore perspectives from the insurance sector, city resilience planners, and policy makers, and the role that NASA Earth observation tools play in supporting decisions related to these actors and in building and sustaining community resilience.

Speakers:

Shanna N. McClain, AAAS Science & Technology Policy Fellow, NASA Applied Sciences Program

David S. Green, NASA, Program Manager, Disasters

Andrew Kruczkiewicz, Research Staff Associate, International Research Institute for Climate and Society

Ron Eguchi, President and CEO of ImageCat, Inc.

Linda Langston, Director of Strategic Relations, National Association of Counties (NACo)·

Karen Jackson, Director of Recovery and Community Initiatives, Project Hospitality

S-C 17 Warning Signs: Assessing the Societal and Environmental Impact of Proposed Federal Funding Cuts to Environmental and Climate Research and Development Programs

The President's FY 2018 budget proposes $7.8 billion for federally funded climate and environmental (CE) R&D, a roughly $2 billion or 21 percent reduction in CE R&D between FY 2017 and 2018, with significant reductions to most of the thirteen agencies in the federal climate and environment portfolio. As Congress continues deliberating on 2018 appropriations, the report "Warning Signs: Assessing the Societal and Environmental Impact of Proposed Federal Funding Cuts to Environmental and Climate Research and Development Programs" informs policymakers and the broader community of the risks and impacts to our nation's economic, societal, and environmental security and leadership if these environment and climate R&D cuts become a reality. The 115-page report provides a summary of the proposed FY 2018 reductions and an agency-by-agency detailed analysis. This report was funded by the Novim Foundation and developed by a group of science and policy leaders who have served in both Republican and Democratic administrations.

Speakers:

Kei Koizumi, American Association for the Advancement of Science (AAAS)

Aristides Patrinos, Chief Scientist & Director of Research, Novim

Joel Widder, Co-Founder and Partner, Federal Science Partners

Workshops

WEDNESDAY, JANUARY 24
2:00 PM - 4:45 PM

W-1 Energy-Water Nexus Policy Integration: Toward New Strategies for States and the Federal Government

Energy and water infrastructures are in many cases interconnected, and this interconnection can lead to significant complexity in state and federal policy dealing with energy and water. More integrated approaches to energy and water policy could improve outcomes for decision makers who must operate in this complex policy landscape. To address this topic, the U.S. Department of Energy's Office of Policy has supported the National Conference of State Legislatures (NCSL) and the National Association of State Energy Officials (NASEO) to develop a set of three policy white papers on the energy-water nexus. The topics of the white papers are (1) Water Use in Electricity Generation, (2) Energy Performance of Water Infrastructure, and (3) Lifecycle Water Use in Oil and Gas Production. With the three policy white papers as a starting point, this workshop seeks to engage participants with diverse backgrounds to generate a set of strategies and next steps for more integrated, effective policy at the energy-water nexus. For example, the interactive breakout sessions could inspire participants to identify lessons from policies in one state that could be applicable in another state, or to identify new collaborations between decision makers that could be beneficial to convene.

Speakers:

Samuel Bockenhauer, Physical Scientist, Office of Policy, US Department of Energy, DOE (chair/moderator)

Glen Andersen, Energy Program Director, National Conference of State Legislators

Sam Cramer, Program Manager, National Association of State Energy Officials

Helcio Blum, Research Scientist, Lawrence Berkeley National Laboratory (LBNL)

Svetlana Ikonnikova, Energy Economist, Bureau of Economic Geology, University of Texas at Austin

W-2 Partnerships for Building a Sustained National Climate Assessment

This workshop will provide an opportunity for academics, NGOs, professional societies and the private sector to co-design the civil society components of an evidence-based Sustained National Climate Assessment (SNCA). The concept is to build from the outside in (from the civil society side) in order to support the Federal Government, in whatever mode it is functioning at any given time, in meeting the needs of US citizens in assessing the state of science, and understanding and preparing for the impacts of climate change on all sectors and regions. Following the major engagement efforts of the Third National Climate Assessment, and in anticipation of the need for far more external support, this collaborative workshop will focus on opportunities for engagement, implementation pathways, possible resources and governance options. Suggested partners and participants can include academia, civil society, foundations, state and local governments, the private sector, and professional societies. This session is designed to help people build a structure for a process in which citizens can help understand the impacts of climate change and how to prepare for them.

Speakers:

Katharine Jacobs, Director, Center for Climate Adaptation Science and Solutions, University of Arizona (Organizer)

Richard Holland Moss, Senior Scientist, Joint Global Change Research Institute, Pacific Northwest Laboratory, University of Maryland (Organizer)

Virginia Burkett, Chief Scientist, Climate and Land Use Change, US Geological Survey (USGS), Acting Chair, Subcommittee on Global Change Research

Admiral David Titley, Pennsylvania State University, Center for Solutions to Weather and Climate Risk

Tim Carter, President, Second Nature

David Herring, Director of Communications, NOAA Climate Program Office

Anne Waple, Fernleaf Interactive and Studio 30K

Cathy Whitlock, University of Montana

W-3 Paths to Addressing Climate Risk in the Design, Construction and Operation of the Built Environment

Climate change and increasing populations in vulnerable locations are changing the risks faced by communities and the nation as a whole. The current design, construction and operations process must evolve to address these risks. Past events are no longer a good predictor of future events. The codes, standards and other guidance that designers have relied on to deliver high-performance projects are based on past events. New methodologies are needed to help incorporate climate/weather science into the process. Climate scientists and building scientists must come together to greater understand the data that can be delivered and how it could be used by the building industry.

The American Society of Civil Engineers has begun to examine how engineering practice and the standards and guidance designers rely on will need to change. Their Committee on Adaptation to a Changing Climate (CACC) has issued a white paper, Adapting Infrastructure and Civil Engineering Practice to a Changing Climate, calling for the development of methods appropriate for incorporation in practice, codes, standards and other guidance for dealing with non-stationarity and uncertainties of future extremes. The National Institute of Building Sciences Consultative Council has called for an effort to bring climate scientists and building scientists together to identify approaches for the use of climate data in design, construction and operations decision making. The U.S. Government Accountability Office examined the need to incorporate future climate risk in codes, standards and other guidance and how federal agencies should engage in such efforts. This workshop will identify the issues surrounding incorporation of climate risk into design, construction and operations and potential solutions identified to date and then engage participants in identifying paths forward.

Speakers:

Ryan Colker, Presidential Advisor, National Institute of Building Sciences (Moderator)

Richard Wright, Past Chair, Committee on Adaptation to a Changing Climate, American Society of Civil Engineers

Ann Kosmal, Architect, U.S. General Services Administration

W-4 Pathways to Sustainability Education in America's Community Colleges

NCSE's Community College Alliance for Sustainability Education (CCASE) will host this session as part of its development of The NCSE Community College Handbook for Sustainability Education and Operations. This Handbook is a practical resource on sustainability education and operations. In this working session we will share draft chapter content and further develop content with input from practitioners and session participants. We seek input and guidance from anyone interested in sustainability at community colleges. We also seek input on transfer pathways to four four-year colleges and universities, and invite those interested in workforce development, community and civic engagement, and policy-making. The Handbook currently is composed of eight chapters. We will take a deep dive to develop each chapter, including additional case studies and resource links.

Speakers:

Robert W. Franco, Director, Institutional Effectiveness, Professor, Pacific Anthropology, Kapi'olani Community College, University of Hawaii

Dr. Stephen Summers, Associate Vice President School of Arts & Sciences, Seminole State College of Florida

Krista Hiser, University of Hawaii System Sustainability Curriculum Coordinator, Kapi'olani Professor of English, Kapi'olani Community College, University of Hawaii

Maria Boccalandro, Director, Sustainability Education and Programs, Cedar Valley Community College, Dallas County Community College District

W-5 Inventorying and Analyzing Urban Green Infrastructure for Community Resilience: Best Practices

Around the world, biodiverse green spaces in cities are increasingly recognized as "green infrastructure" capable of providing lower cost, more resilient, and healthier services to humans than the corresponding energy-intensive "gray infrastructure" of the built environment. The benefits of urban trees alone provide billions of dollars of value each year and produce their own energy! To manage green infrastructure for resilient cities, we must know what we have – both in terms of the natural components of green infrastructure as well as the social structures that support it. Yet, relative to the accounting of gray infrastructure, or to large parks and nature preserves, we lack complete inventories of urban green infrastructure.

The goal of this workshop is to bring together experts and workshop participants to advance a set of best practices for developing a comprehensive inventory and analytical strategy for urban green infrastructure (UGI). We will consider multiple forms of UGI including urban forests, waterways, agriculture, parks and greenways, as well as the social and institutional structures that support them. The workshop will consist of presentations by experts, followed by break-out groups engaging all participants and invited experts, and end with a facilitated discussion of best practices.

Speakers:

Sarah Kathryn Mincey, Associate Director, Integrated Program in the Environment, Indiana University (moderator)

Heather Reynolds, Associate Professor of Biology, Indiana University (moderator)

Morgan Grove, USDA Forest Service and Baltimore Urban Long-term Ecological Research Project

Howard Rosing, Director of the Steans Center at DePaul University and a leader in the Chicago Urban Agriculture Mapping Project

Andre Denman, Principle Park Planner & Greenways Manager, Indianapolis

Karen Haley, Executive Director of Indianapolis Cultural Trail

David Bodenhamer, Executive Director of The Polis Center

David Forsell, President, Keep Indianapolis Beautiful

W-6 The Backbone of Sustainable Infrastructure: Cooperative Ownership & Public Banks

Conventional business models and financial institutions have proven deeply inadequate to build sustainable economies, infrastructure, or communities. The most positively disruptive models extant to replace these outmoded modalities are Community Owned Cooperatives (COCs) and Public Banks (PBs). Participants will learn how these institutions work, why they are successful, and how to implement these models in their own communities.

Speakers:

Walt McRae, Founding Chair and CEO, Public Banking Institute

Ellen Brown, President, Public Banking Institute

Ivan Frishberg, First Vice President, Sustainable Banking, Amalgamated Bank of New York City

W-7 Co-Designing Community Resilience: A Hands-On Workshop to Launch New Community Science Projects

Join us for the chance to apply your experience, knowledge, and insight to a real-world community priority. Community science – where community leaders and scientists work together to use science to advance community priorities – has real impact in communities, promotes equity, and advances science. The Thriving Earth Exchange (TEX) uses community science to address local challenges surrounding climate change, natural hazards, and natural resources – and you can too. During this workshop, you, whether you are a scientist, educator, or policy-maker- will work with local community leaders to design concrete community science projects that address local resilience and sustainability priorities. The projects you design will move forward. Following this workshop, TEX will recruit volunteer scientists to work with the communities and support the projects as they make local impact. You can make a difference.

Speakers:

Melissa Goodwin, Project Manager, Thriving Earth Exchange, American Geophysical Union

Raj Pandya, Director, Thriving Earth Exchange, American Geophysical Union

W-8 Are Distributed Infrastructure Systems More Sustainable than Centralized Systems? An Integrated Multiple Infrastructure Perspective from Cities

Distributed, localized and decentralized infrastructure systems represent a new movement in sustainability practice and experimentation in cities. While cities all over the world are moving toward more localization and distributed implementation in multiple key infrastructure sectors, operating under the assumption that these

practices will lead to better sustainability outcomes, the science around distributed infrastructure systems to advance sustainability outcomes is yet nascent. Systems science is needed to: a) Identify if and when distributed infrastructures will advance sustainability outcomes, considering trade-offs and synergies across scale and across multiple outcomes desired by cities related to economy, environment, climate, equity, public health and local well-being; and, b) Develop new ways of thinking of distributed infrastructure design, integrating engineering, natural systems, as well as social, behavioral and institutional factors important to financing and maintaining distributed infrastructures.

The workshop will: 1) Present an overarching framework for understanding the benefits and downsides of distributed infrastructure systems, covering multiple sectors that provide essential infrastructures and food supply to cities; 2) Introduce methodology for assessing the contribution of city-scale actions to address environment, equity and health impacts both within and outside city boundaries, quantifying trade-offs and co-benefits using urban food-energy-water interactions as the interacting sectors; 3) Examine integrative design principles, with a focus on green infrastructure, that includes considerations of infrastructure stewardship; 4) Explore the behavioral components affecting how people interact with distributed infrastructure systems, and, 5) Present specific policy and city-practice priorities and leverage points relative to distributed infrastructure futures.

Moderator:

Samuel Tabory, Research Associate, Sustainable Healthy Cities Network, Humphrey School of Public Affairs, University of Minnesota

Speakers:

Anu Ramaswami, Professor; Principal Investigator, Sustainable Healthy Cities Network, Humphrey School of Public Affairs, University of Minnesota

Dana Boyer, Sustainable Healthy Cities Researcher, Humphrey School of Public Affairs, University of Minnesota

Cory Fleming, Senior Project Manager, Center for Sustainable Communities, International City and County Management Association

Richard Feiock, Professor; Co-Director, Sustainable Healthy Cities Network, Askew School of Public Administration and Policy, Florida State University

Patricia Culligan, Professor; Co-Director, Sustainable Healthy Cities Network, Earth Institute, Columbia University

Ben Orlove, Professor; Co-Director, Sustainable Healthy Cities Network, School of International and Public Affairs, Columbia University

W-9 The Future of Cities and Urban Sustainability (FoCUS)

Interviews with leading urban researchers around the U.S. identified five substantial gaps in current urban research that impair our capacity to tackle urbanization and sustainability challenges. These gaps are: 1) limited knowledge about the specific complex system dynamics at play in cities and urban regions; 2) shortage of knowledge on new urban forms and spaces, such as urban corridors, networks, and teleconnections; 3) uncertainty on how best and most equitably to implement sustainable infrastructure in urban contexts and how to prioritize ongoing maintenance of cities; 4) a limited understanding of how cities can become more resilient to social, environmental, and technical changes in the face of uncertainty; and 5) inadequate comprehension of the underlying mechanisms behind urbanization as a process, what some have termed urbanization science,

including how to predict future urbanization patterns. These five gaps will serve as themes to organize the workshop. The workshop brings together academics and practitioners to discuss the future of cities and urban sustainability. Participants will discuss how investment in new approaches to infrastructure should inform sustainable urbanization as envisioned by various sustainability frameworks.

Speakers:

Paul Joseph Coseo, Assistant Professor, Arizona State University, Tempe, AZ

Christopher G Boone, Dean, School of Sustainability, Arizona State University

Maria Cruz-Torres, Associate Professor, Arizona State University

Mikhail Chester, Associate Professor, Arizona State University

W-10 Industrial Ecology and Design: A Toolkit for Designing Sustainable Systems

Our current systems of production and consumption are based on a linear model of "taking, using, and wasting" resources to meet the demands needs of a growing global population. This linear production-consumption model is unsustainable as it promotes over-consumption of limited resources because it inadequately considers the connections between environmental, social, technical and economic concerns. Though interest is growing about the environment and sustainability, many organizations struggle to understand how these forces should be incorporated in their everyday practices.

In urban environments, where manufacturing activities declined or moved away, large swaths of vacant land and buildings pose major challenges to urban regeneration. These vacated spaces lack economic activities, business interests and social capital, but they also present opportunities for new interactions among diverse actors. The goal of this workshop is to enable participants to utilize a new framework to build sustainable systems solutions, applied to the case of urban infrastructure regeneration. The toolkit applies "seven capitals" as "innovation lenses" to complex systems challenges. Participants will leave with the ability to apply the toolkit to the regeneration of urban infrastructure, with broader applicability to other complex systems of interaction.

Speakers:

Weslynne Ashton, Associate Professor of Environmental Management and Sustainability, Stuart School of Business, Illinois Institute of Technology

Carlos Teixeira, Associate Professor and PhD Coordinator, Institute of Design, Illinois Institute of Technology

Andre Nogueira, adjunct faculty member, Institute of Design, Illinois Institute of Technology

Marian Chertow, Associate Professor of Industrial Environmental Management and has been Director of the Industrial Environmental Management Program, School of Forestry & Environmental Studies, Yale University

Cornelia Butler Flora, Charles F. Curtiss Distinguished Professor of Agriculture and Life Sciences and Sociology Emerita at Iowa State University and Research Professor at Kansas State University

W-11 Innovations and Success Stories in Sustainable Water Management at the Federal, State, and Local Levels

Since 2002, the Sustainable Water Resources Roundtable (SWRR) has brought together participants from federal, state, corporate, non-profit and academic sectors to advance the knowledge and decision-making

WORKSHOP OVERVIEW

needed to sustain the nation's water resources. SWRR is a subgroup of the Advisory Committee on Water Information, which advises federal agencies responsible for managing water resources. The workshop will bring together participating entities (federal agencies, state and local agencies, academia, NGOs, and business) to present and discuss innovations and successful programs in the area of water management. Some of these efforts include multiple benefits beyond water, including energy and emissions reductions, pollution prevention, and increased resilience of natural and built infrastructure. Time will be allocated for discussion of what worked and what did not, lessons learned, and opportunities for policy development which might facilitate improved water management.

Speakers:

Robert Wilkinson, Adjunct Professor, Bren School of Environmental Science & Management, University of California, Santa Barbara and Co-Chair, Sustainable Water Resources Roundtable (organizer)

Shirlee Zane, Supervisor, Sonoma County Board of Supervisors

Grant Davis, Director, California Department of Water Resources

Robert "Robin" S. Webb, Director, Physical Sciences Division, NOAA Earth Sciences Research Laboratory (Boulder)

V. "Chandra" Chandrasekar, Distinguished Professor, Colorado State University and the Cooperative Institute for Research in the Atmosphere (CIRA)

Marty Ralph, Director, Center for Western Weather and Water Extremes (CW3E), Scripps Institution of Oceanography

Carl Morrison, President, Morrison & Associates, Inc. and Executive Director of the Bay Area Flood Protection Agencies Association

David Berry, Director, Sustainable Water Resources Roundtable (organizer)

W-12 Improve Collaboration for Building Resilience: Leverage Differences Among Collaborators

Complex sustainability problems require working across disciplinary and professional boundaries. Such inter- and transdisciplinary team research is known to present a variety of unique challenges. A key challenge is the difficulty of combining deep knowledge across diverse perspectives into a system view of the problem that successfully aligns available knowledge and expertise in synergistic ways. In this workshop we will present a new approach to developing integrated conceptualizations that employs theories of experiential learning and model based reasoning. The workshop will begin with a brief review of concepts introduced in the associated symposium. Participants will then engage in small group activities based on these concepts and discuss how their own collaboration activities can be modified to more effectively develop transdisciplinary system conceptualizations. Activities include using iterative, consensus model-building to develop a group model of the science-resource management interface for a management unit, or to develop an idealized, interdisciplinary resilience and hazards adaptation and management plan for a community.

We recommend that workshop attendees participate in S-C10 Case Studies of Employing Model Based Reasoning to Improve Transdisciplinary Collaboration Competencies

Speakers:

Deana D. Pennington, Associate Professor, Department of Geological Sciences, University of Texas at El Paso

Shirley Vincent, Principal and Owner, Vincent Evaluation Consulting, LLC

David Gosselin, Director of Environmental Studies, University of Nebraska at Lincoln

Rod Parnell, Professor, School Earth Sciences & Environmental Sustainability, Northern Arizona University

Geoffrey Habron, Professor of Earth and Environmental Science, Furman University

W-13 Vacant to Vibrant: Great Lakes Repurposing of Vacant Land for Community and Ecosystem Benefit and Resilience

Vacant to Vibrant has been working since 2011 with post-industrial cities in the Great Lakes Basin. These post-industrial cities struggle with land use challenges including vacant residential neighborhoods. These changes were brought about by demographic shifts, loss of employment, and loss of home ownership during the housing crisis. The workshop will explore techniques in building resilient natural and social infrastructure in cities suffering from demographic shifts, loss of population, decline in housing stock, and fractured communities. Discussion questions include: How can ecosystem services be restored to these communities by green infrastructure development that includes community access and use, watershed protection, and possible employment and educational opportunities? Can the scientific, academic, and regulatory community work with community residents and resources for greater resilience in urban communities? Outcomes will include new ideas for restored resilience in post-industrial cities, design considerations in restoration of ecosystem services and green infrastructure, and brainstorming of scaling-up of green infrastructure in urban centers to provide the broadest services to the human and ecological communities supporting them.

Organizers:

Geri Unger, Principal Investigator, TerrAqua Environment and Science, LLC,

Sandra Albro, Research Manager, Holden Forests and Gardens

W-14 A Climate Resiliency Decision Support Tool

A holistic approach towards sustainability and resiliency of the built environment is complex, as the design, engineering, and construction of physical infrastructure must respond to a wide range of goals, disciplinary constraints, and conflicting criteria. Therefore, developing an integrative approach to support environmental decision-making involves understanding the complex and dynamic processes of interdisciplinary collaboration, as well as interactions among domain experts with diverse perspectives.

Currently, there are no comprehensive visualization tools for effective interdisciplinary built environment resiliency analysis and design decision making. This workshop will discuss and seek input from multiple disciplinary experts for developing such a tool. The primary goal of the session is a clear identification of available technologies, issues, variables, datasets for processing, and suitable analytical tools to be used for its development. Building on recent advances in GIS, Building Information Modeling (BIM), LIDAR (Light detection and ranging) panoramic imaging, 2D and 3D modeling programs and recent capabilities of immersive software and hardware, participants will discuss technologies, critical climate information and strategies that must be incorporated to develop this decision-making and visualization platform.

Speakers:

Marilys Nepomechie, Department of Architecture, Florida International University (Co-Moderator)

Rita Teutonico, Associate Dean of Research, Florida International University (Co-Moderator)

WORKSHOP OVERVIEW

Jeff Carney, Coastal Sustainability Studio, Louisiana State University

Robert O'Connor, Program Officer, Decision Risk & Management Sciences, National Science Foundation

David Grove, Rand Corp

Shahin Vassigh, Associate Dean, Sustainable Built Environment & Informatics, Florida International University (invited)

W-15 Rebuilding Puerto Rico & Caribbean Islands - Integrated Approach to Resiliency, Energy & Water Infrastructure and the Built Environment

An interactive participatory session focusing on the educational imperative in rebuilding Puerto Rico and the other Caribbean Islands utilizing sustainable resources, energy & water, and a sustainable economy and workforce. Learn about challenges, opportunities and how to get involved.

Speakers:

Scott Sklar, Adjunct Professor The George Washington University and Leader of GWU's Environment and Energy Management Institute, and President of The Stella Group, Ltd. (moderator)

Paul Sullivan, Professor of Economics, National Defense University (NDU)

Hyon Rah, Adjunct Professor, University of the District of Columbia

Estrella D. Santiago Pérez, Environmental Affairs Manager, Corporación del Proyecto ENLACE del Caño Martín Peña, Puerto Rico

Quentin Kelly, CEO of Worldwater & Solar (NJ)

Luis Carlos Robles, Property Management Coordinator for the Caño Martín Peña Community Land Trust

Exhibitors

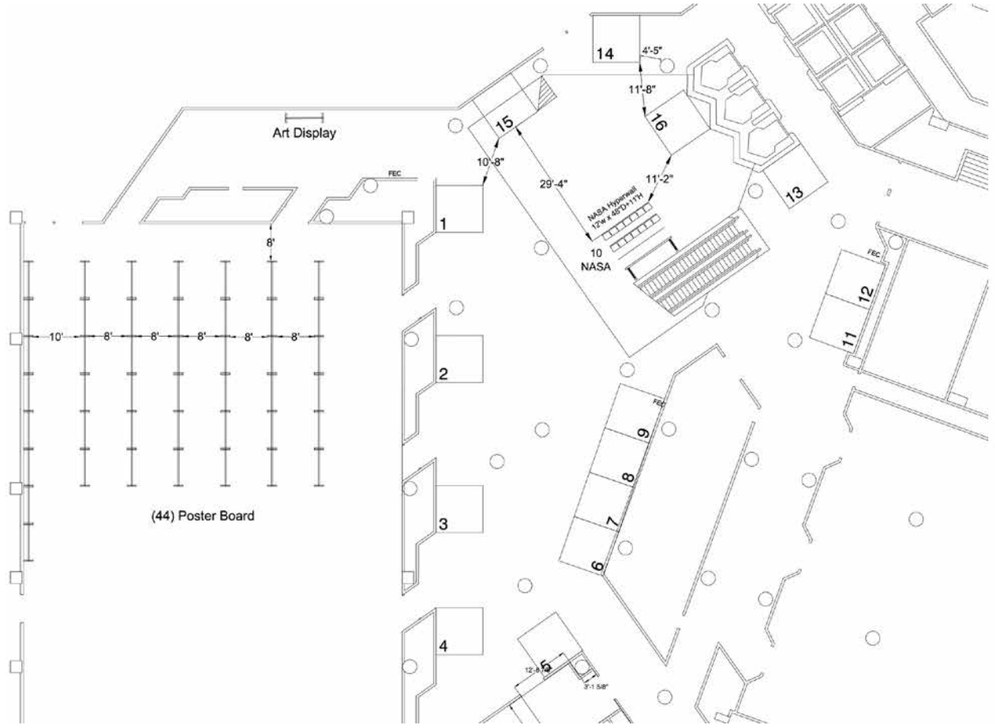
Regency Foyer & Ballroom AB

Monday Hours: 5:00 pm -6:30 pm

Tuesday Hours: 8:00 am – 6:30 pm

Wednesday Hours: 8:00 am – 6:00 pm

1. U.S. Forest Service
2. Centers for Disease Control and Prevention
3. Sonoma County Water Agency
4. Pacific Gas and Electric
5. Federal Highway Administration
6. The Earth Institute
7. The University of Arizona
8. The University of Toledo
9. Case Studies in the Environment
10. National Aeronautics and Space Administration
12. U.S. Geological Survey
13. U.S. Department of Agriculture
14. American Geophysical Union
15. National Oceanic and Atmospheric Administration
16. UN Environment



Posters

1. **Sustainability Standards and Sustainability Reporting Is the Accounting Profession**
   Jay Keith Baker, North Lake College

2. **Evaluation of Green Roofs Impact on Urban Stormwater and Heat Islands**
   Katherine Bartels, Missouri University of Science and Technology

3. **Water Distribution System Adaptation to Increasing Temperatures**
   Emily Bondank, Arizona State University

4. **Infrastructure Summer Camp: Art-led Environmental Education to Reveal the Interdependence of Built and Natural Infrastructure**
   Jonee Kulman Brigham, Institute on the Environment and University of Minnesota

5. **Sea Stewards Handbook: A Resource for Promoting an Ocean Literate Society**
   Christian Brown, Alicia Keefe, NOAA

6. **A Sustainable Solution to Global Warming: North American Renewable and Neutral Energy Alliance (NARNEA)**
   Thomas Clerkin, José Rial, UNC Chapel Hill

7. **Trash to Energy: From Waste Coffee and Seashells to Biofuel**
   Christopher de la Bastide, Yelda Hangun-Balkir, Manhattan College

8. **Air Quality Modeling of a Green Infrastructure Scenario: A Case Study in Kansas City**
   Robyn Deyoung, Angie Shatas, Environmental Protection Agency

9. **Pathways to Coastal Resiliency: the Adaptive Gradients Framework**
   Max Roman Dilthey, Pamela Judge, Elisabeth Hamin, University of Massachusetts Amherst

10. **Challenges and Innovations in Operationalizing the 2015 UN SDGs for Equity In Water and Energy Infrastructure Development**
    Catherine Drumheller, Oak Services, LLC

11. **Optimizing Sustainable Reconstruction in an Era of Increasing Disasters**
    Vidushi Dwivedi, Daniel J Garcia, Stephen H. Carr, William M. Miller, Mike M. McMahon, Northwestern University; Missaka Hettiarachchi, Anita van Breda, World Wildlife Fund

12. **How to Play with Fire and Not Get Burned: Building an Evidence-Based Approach to Wildfire Risk Reduction in California**
    Barbara Elliot and students, Fleming College

13. **Living on the Edge: Developing Climate Resilience in Coastal Cities**
    Barbara Elliot and students, Fleming College

14. **Rethinking the Impervious City: an Integrated Approach to Stormwater Management in Canada's Largest City**
    Barbara Elliot and students, Fleming College

15. **Riding Out the Storm - The Case For Not Evacuating: A 72-Hour Disaster - Preparedness Plan for Miami-Dade County**
    Barbara Elliot and students, Fleming College

16. **Cool Roofs for a Cooler Climate: A Comparative Study of the Elevated Urban Frontier**
    Barbara Elliot and students, Fleming College

17. **Online Learning Student Capstone Experiences**
    Crystal Fey, University of Wisconsin Extension and CEOEL

18. **Market Analysis of Barriers to Electric Vehicle Adoption**
    Sarah Fischer, The Ohio State University School of Environment and Natural Resources and The Ohio State University

19. **Using Innovative Community-University Partnerships to Increase Social Resilience**
    Peter Friederici, Luis Fernandez, Madison Ledgerwood, Danielle Austin, Northern Arizona University

20. **Plattsburgh Power! Unique Service Utility Arrangements that Promote Environmental Behavior Change and Build Community**
    Curt Gervich, SUNY Plattsburgh Center for Earth & Environmental Science

21. **EPA's Water Security Test Bed**
    James Goodrich, Tonya Nichols, Environmental Protection Agency

22. **Remediation of Dyes by Biowaste from Wastewater**
    Logan William Graney, Yelda Hangun-Balkir, Manhattan College

23. **Evaluating the Clean Power Plan and Its Impacts on Childhood Asthma Incidence Rates**
    Molly Hammersmith, Joy Dolejs, The University of Findlay

24. **Climate Change Adaptation through Local Comprehensive Planning**
    Lara Hansen, Eric Mielbrecht, EcoAdapt, Stacey Justus Nordgren, Foresight Partners Consulting

25. **Distributed Energy Generation for Climate Resilience**
    Eliza Hotchkiss, National Renewable Energy Laboratory

26. **NGOs and Sustainable Livelihoods: Lessons from Ecotourism in Indonesia**
    Chloe King, The George Washington University

27. **Wetland Establishment in the Federal Reservoirs of Kansas to Increase Water Security**
    Gary Koons, Kansas State University and Stantec

28. **Building Sustainability through Energy Management: Opportunities for Water/Wastewater Utilities in Latin America**
    Katy Lackey, Water Environment & Reuse Foundation

29. **PSEG ISS / NJHEPS Green Teams Program: a corporate-academic-community partnership model to address sustainability issues**
    Jill Lipoti, Henry John-Alder, Rutgers University; Amy R Tuininga, Rohan Padhye, Montclair State University

30. **Use of Data Analytics and Systems Dynamics to Analyze Oil Spillages in the Niger Delta Area of Nigeria**
    Christian Madu, Benjamin C. Ozumba, Valentine E. Nnadi, Ikenna C. Ezeasor, Shell Center for Environmental Management & Control, University of Nigeria; Chuhua Kuei, Pace University

31. **Helping States and Cities Build Affordable, Effective Capabilities to Recover from Radiological Disasters**
    Matthew Magnuson, Environmental Protection Agency

32. **The Science Behind the Scene: Overview of Research to Support Contamination Incident Response Recovery at EPA National Homeland Security Research Center**
    Matthew Magnuson, Environmental Protection Agency

33. **Showcasing a Cost-Effective, Feasible Net Zero Energy Renovation for an Existing Commercial Building in DC**
    Christine McEntee, Caitlyn Camacho, Matthew Boyd, American Geophysical Union, Roger Frechette, Interface Engineering

34. **Building Resilience: Career Pathways for the Next Generation of Resilience Workers (National Transportation Career Pathway Initiative)**
    Glenn McRae, Northeast Transportation Workforce Center at the University of Vermont

35. **Urban Climate-Resilient Infrastructure Finance in the Era of the Paris Accord**
    Peter B Meyer, Reimund Schwarze, University of Louisville, Helmholtz Centre for Environmental Research

36. **Measuring Higher Education Students' Sustainability-related Private and Public Behaviors and their Relationship with Sustainability-related Knowledge and Attitudes**
    Jessica Michel, Gary Weiser, Columbia University

37. **Bio-drying Technology: A Sustainable Approach for Enhancing Pre-treatment and Thermal Properties of Green Waste**
    Mohammed Mutala, University of Kocaeli

38. **Human Superpredators and the Built Environment Shape Carnivore Ecology across an Extensive Urban Ecosystem**
    Remington Moll, Michigan State University

39. **Incorporating Stormwater Management into an Environmental Curriculum**
    David Nadler, New York Institute of Technology

EXHIBITS AND POSTERS

40. The Use of Green Infrastructure and its Effects on Climate Change Resiliency in Philadelphia
Charlotte Shade, Villanova University

41. Agent-Based Modeling of Critical Infrastructures
Nima Shahriari, Adrian V. Gheorghe, Mamadou D. Seck, Old Dominion University

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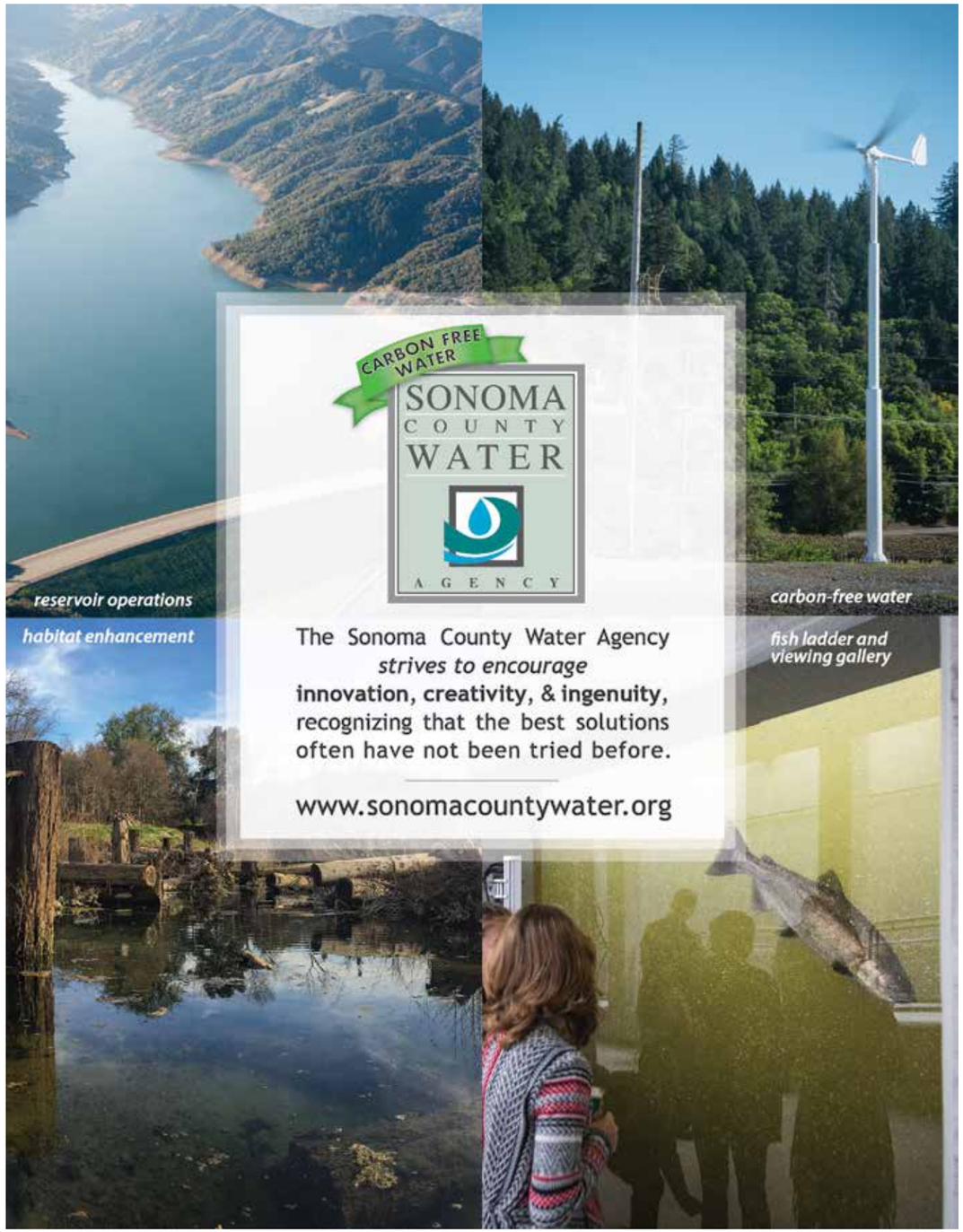

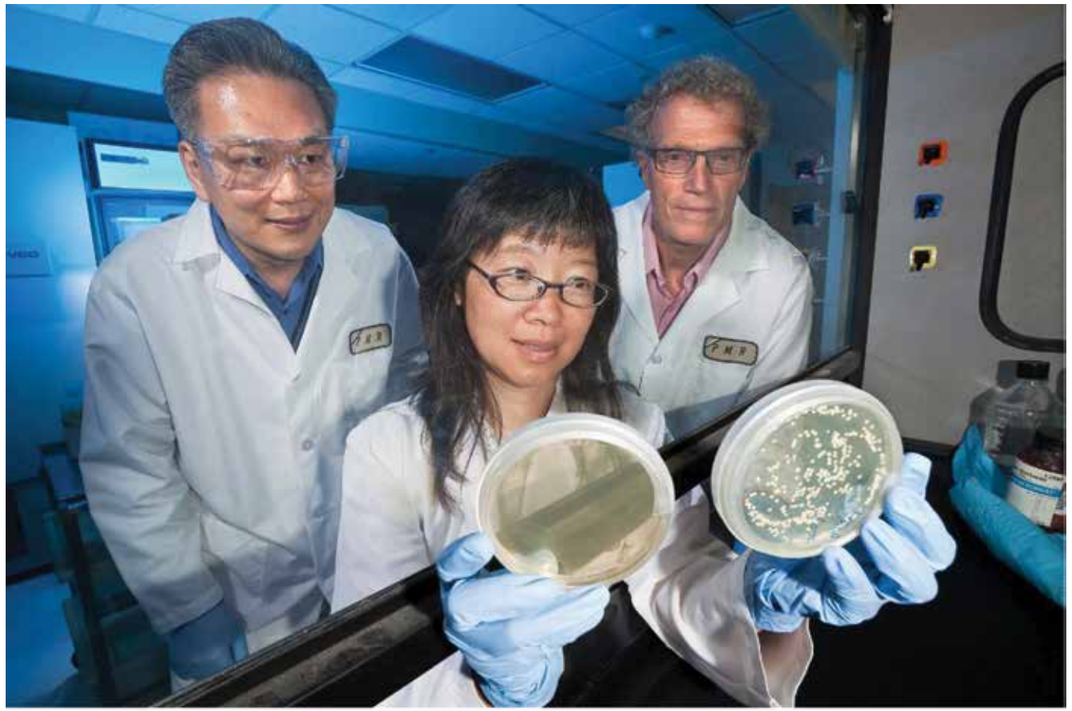

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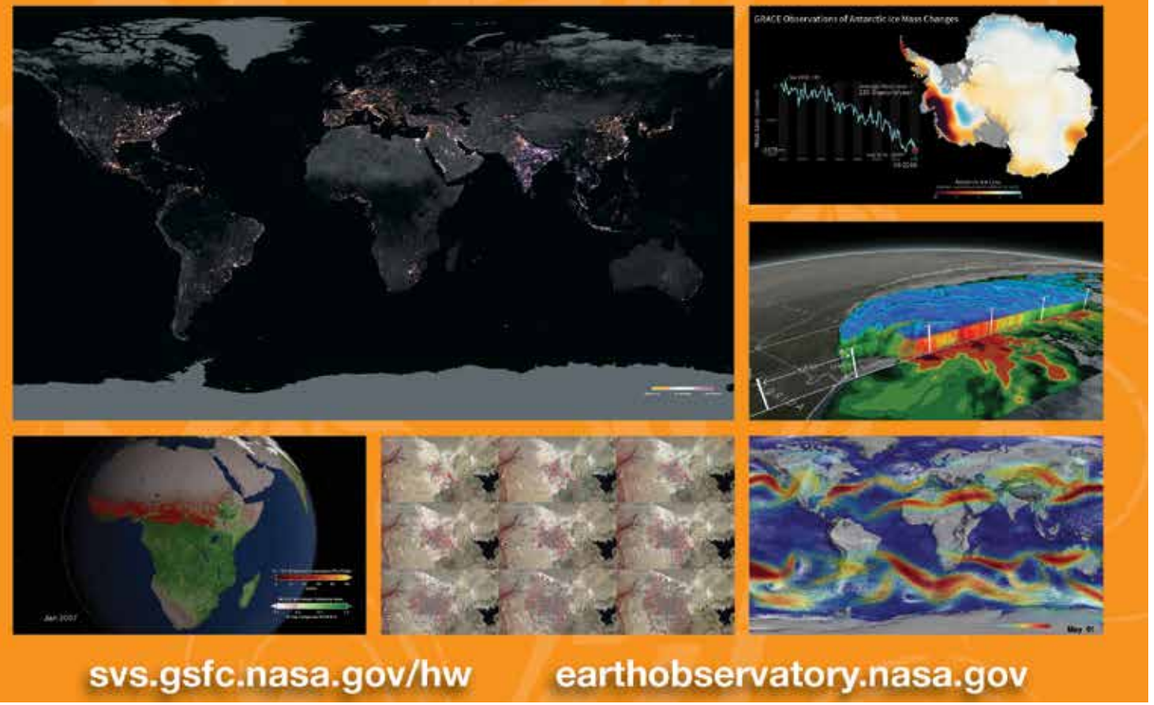

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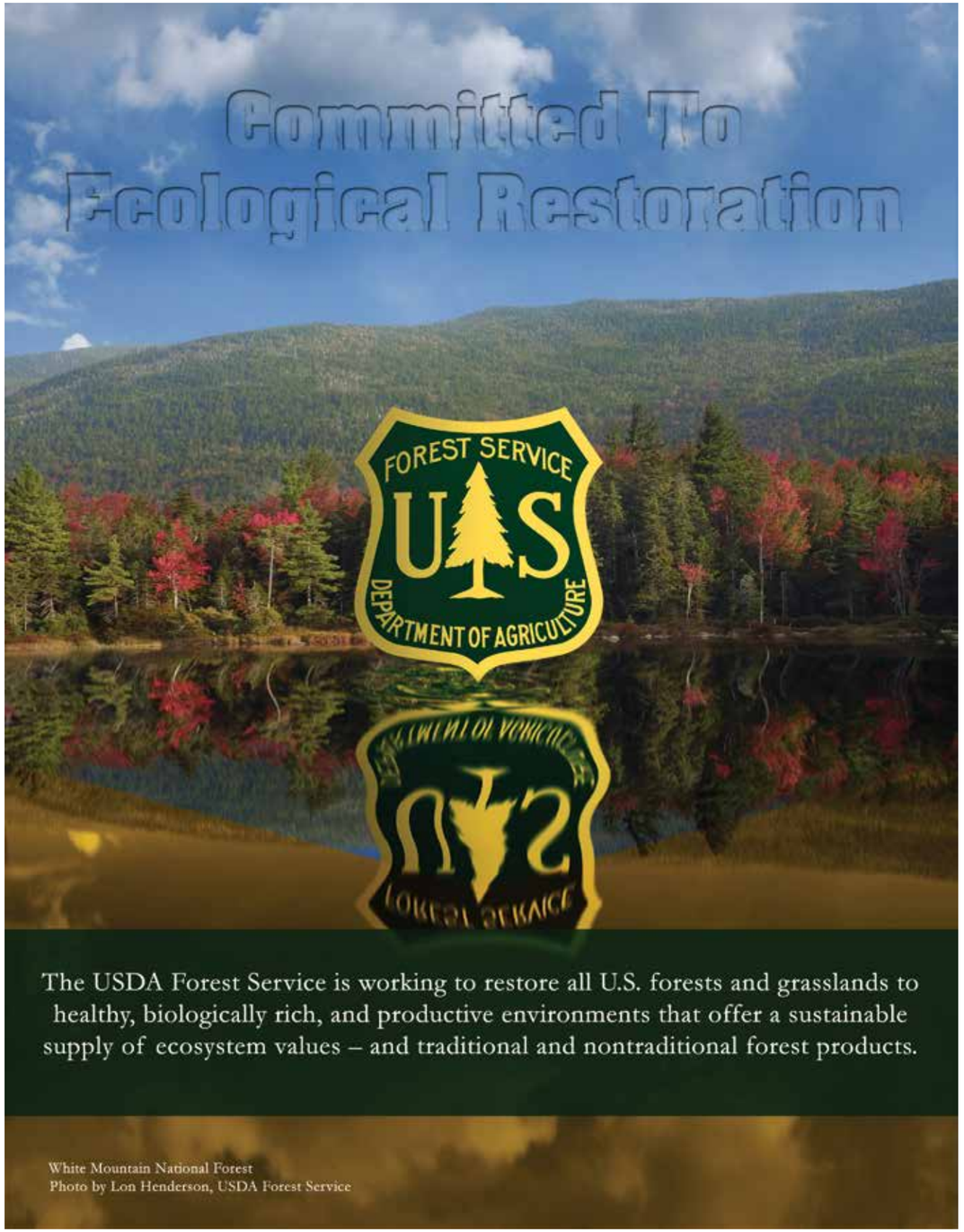

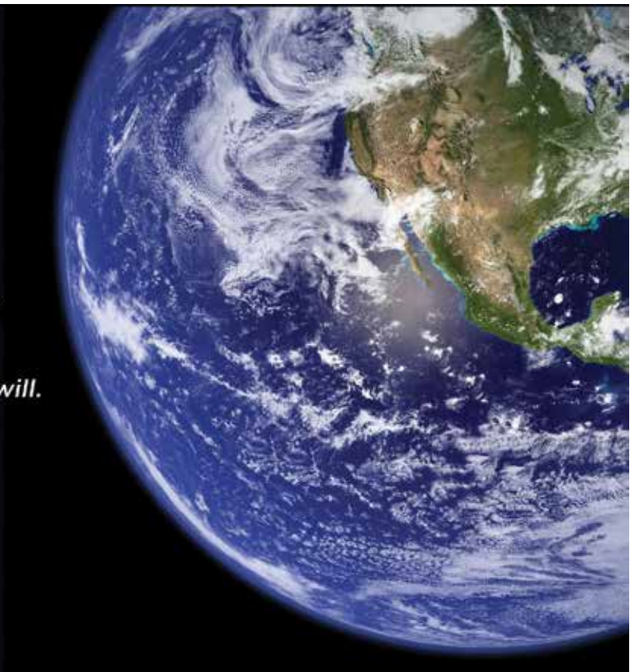

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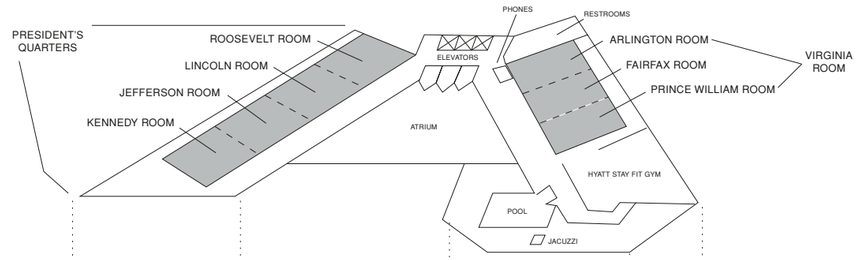

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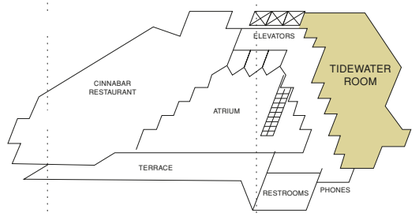

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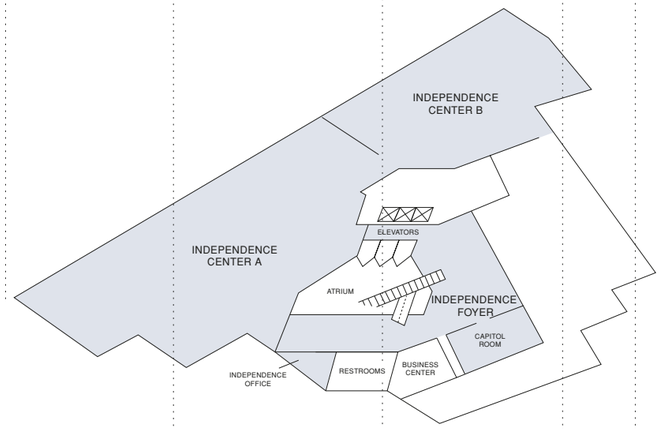

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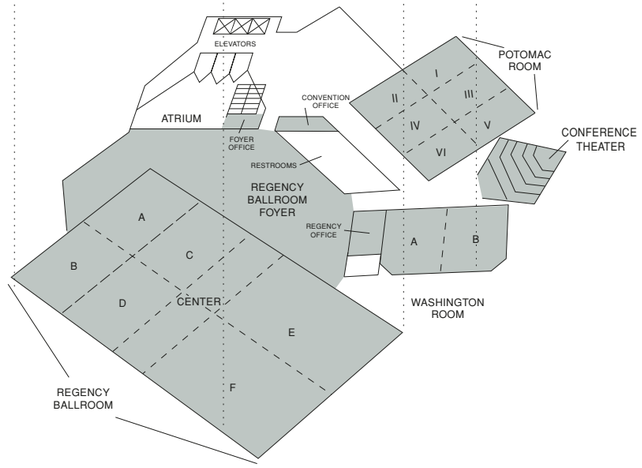

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