CODE: AA
PRESENTATION TYPE: Workshop
TITLE: Climate Smart Agriculture | **SUBMITTER**: Michael Davidson

Planetary sustainability requires simultaneous management of all factors. We tend to be climate-change myopic and, though global warming and perturbations of precipitation are critically important to mitigate, we also need to address the nitrogen/phosphorus cycle, soil and water hypoxia, ocean acidification, water and land use, population growth, energy consumption, and biodiversity. Climate-smart Agriculture (Climate-smart Agriculture) is a model that holistically addresses all ecosystemic factors. Climate-smart Agriculture is a concept, methodology and suite of tools that provides three objectives: mitigation, adaptation, and food security. The criticality of widespread and urgent adoption of Climate-smart Agriculture is evidenced by four gaps we face today: a 56% food calorie gap between 2010 and 2050; a 600 million hectare gap if we continue to farm extensively; an 11 gigaton GHG gap if we are to maintain a temperature increase of 2 degree C; and a 31% water gap to irrigate the crops that we anticipate will be required for the 10 billion people of Planet Earth in 2050. In order to close those gaps we must mitigate hypoxia of soils and water bodies; the conversion of forested land into cropland; the incidence of chemical application for pest management; eutrophication of water bodies; and significantly reduce nitrogen and carbon sourcing. At the same time we must adapt to changing environmental conditions by incorporating integrated pest management; the use of cost-effective innovations for post-harvest loss, water and fertilizer management, soil health management, slope management, and hybrid seeds. By ensuring accessibility and availability of freshwater, macrobiotic-rich soils, innovations in seeds and reductions in post-harvest loss, we will be able to ensure food security for the Planet.

The concept of Climate-smart Agriculture has been in practice for 20 years and a recent study shows evidence that 12 million farms, covering 37 million hectares in sub Sahara Africa who adopted the principles of Climate-smart Agriculture averaged a 79% yield increase; a 97% water productivity gain; a 0.91 equivalent ton of carbon sequestration/household/year; and a 141% increase in net EBTIDA. One of the goals of this session will be to unpack the economics of Climate-smart Agriculture. A myth about Climate-smart Agriculture is that it is beyond the entry point of smallholder growers, but the opposite is the case. All the tools of Climate-smart Agriculture increase efficiencies and make greater use of energy, water, inputs and reduce annual variable costs while returning a positive ROI in year one.

The opportunity for the successful incorporation and implementation of Climate-smart Agriculture in the United States today has arrived. The US can enhance and extend the concept of Climate-smart Agriculture by adding critical multidisciplinary and trans-disciplinary approaches. Contributions from ecosystem managers, water managers, public officials, sociologists, political scientists, ecologists, health delivery experts, energy planners, urban planners, and educators are all salient stakeholders for planning and executing programs of Climate-smart Agriculture.

CODE: BB
PRESENTATION TYPE: Workshop
TITLE: Science Serving Citizens: The USGS Water Mission | **SUBMITTER**: Brian McCallum

This session highlights the journey of how water data is collected by the U.S. Geological Survey through how it is analyzed and served in service to the public. The session will start with a discussion of the new Hydrologic Instrumentation Facility on the University of Alabama campus and advancing the science of developing the next generation of water measurement instrumentation and methods. The facility will also house the new Network Operations Center to provide real-time assessment of the USGS Water Observing Systems Network. The second presentation will focus on the federal water monitoring network that is truly a "network of networks" that is operated throughout the United States for the benefit of water agencies at all levels of the government, science and academia research, emergency management officials and forecasters, and the public—all for the protection of life, property, the environment and the economy in the United States and its territories. The third presentation will delve into the USGS National Surveillance project as an example of how USGS water data are used to stay aware of emerging water issues through sophisticated data analyses and research. The final talk will explore how users' access and interact with USGS water data, either from high-volume data streams, through next-generation interactive web pages, or mobile-friendly, map-based dashboards. This session literally covers the USGS water data mission "from the stream to the screen".

CODE: CC
PRESENTATION TYPE: Workshop
TITLE: Urbanizing the Watershed Management Plan: A New Frontier for Improved Effectiveness and Equity? |
SUBMITTER: William D. Shuster

The Watershed Management Plan (WMP) is the basis for nonpoint source (NPS) pollution management under the Clean Water Act. A WMP provides an overview of the characteristics of a watershed, outlines potential water quality threats and stressors, and suggests watershed management actions to protect and restore water bodies impacted by NPS pollution. In order to be considered eligible for several state pass-through funding programs, such as the 319 Nonpoint Source Implementation Grants or the Clean Water State Revolving Fund Loan Program, NPS management projects must be within an area covered by an EPA approved WMP. As a result, the NPS Program places a priority on achieving complete geographic coverage of approved WMPs to support statewide protection of water quality from NPS pollution. Likewise, if an approved plan is not in place, legacy environmental justice and disparity issues are compounded in our pluralistic urban communities. Like most coastal cities, landscapes were once dominated by lake plain and coastal wetlands, but have been heavily transformed by urbanization, resulting in almost all inland surface waters being eliminated through filling of wetlands or containment of streams, and ageing and breakdown of built infrastructure (e.g., wastewater collection and conveyance), with negative impacts of sewer overflows on receiving waters. The residents are thereby faced with numerous water quality and management issues today, such as flooding and basement backups, polluted runoff, and sewer overflows. These issues are compounded by environmental justice challenges. Past attempts to create a WMP can fail due to a complex set of political and technical challenges resulting from the highly urbanized nature of the watershed. However, a sewershed management plan may offer an improved framing for how to alleviate water quality and hydrosocial concerns in a single planning forum. In this workshop we will go over essential elements of a WMP and how we might approach these from an urban perspective, and discuss resident and community engagement around this process. Examples will be drawn from current experience with development of a WMP in Detroit MI.

CODE: A
PRESENTATION TYPE: Technical
TITLE: Water Conservation Applications in the Northeast | **SUBMITTER**: John W. Balay

Water is a finite and irreplaceable resource that is fundamental to human well-being. It is only renewable if well managed (United Nations, 2015). Water conservation is a management strategy focused on using water efficiently and avoiding waste to ensure adequate water supply today and into the future. Water conservation practices tend to get less attention in the more water rich eastern half of the United States compared to western states, but are arguably no less important. Drivers including developmental and operational costs, climate change, regulatory requirements, and grant funding have motivated many water users to implement water conservation measures. Projects range from more traditional approaches to utilizing new and emerging technologies and management approaches to increase water resilience. This topical session will feature a series of presentations highlighting a variety of water conservation projects that have been implemented and are being proposed in the Northeast region.

CODE: B
PRESENTATION TYPE: Technical
TITLE: The 3D Hydrography Program – Status, Acquisition, and Applications | **SUBMITTER**: Silvia Terziotti

As the U.S. Geological Survey develops a 3D National Topography Model (3DNTM), the 3D Hydrography Program (3DHP) data model is being implemented Nationwide. The 3DHP data model features hydrography data vertically and horizontally integrated with the data of the 3D Elevation Program . The 3DHP will import existing hydrography datasets as a foundation, updating and enhancing the data with highly accurate hydrography, derived from lidar data (IfSAR data in Alaska). The 3D data model will support a referencing system discoverable through the Internet of Water. The presentations in this session will provide an overview of 3DHP, a demonstration of the data, and plans for partnerships and acquisition of 3DHP data.

CODE: C
PRESENTATION TYPE: Panel
TITLE: Insights from Several Award-Winning Regional Stormwater Programs | **SUBMITTER**: Juni Shahjabin Alam

Communities face increasing pressure to improve stormwater management from many directions: Climate change brings increased flooding. Regulatory agencies are imposing new obligations to reduce pollutants, and much of the existing infrastructure is aging beyond its useful life. Yet funding is limited. Collaboration can help. In this session, we'll convene a panel of experts associated with several award-winning stormwater partnerships, each one taking a different approach to collaboration designed to meet the unique needs of participants. Panelists will represent the perspectives of local governments, utilities, legal counsel, regulatory agencies, consultants, and private industry. They'll talk about how collaboration reduces costs (through economies of scale, better position for grants, and the ability to construct fewer, but more impactful projects). They'll also talk about how collaboration improves environmental results (by addressing issues at their root and incentivizing positive actions). Finally, they'll provide guidance on overcoming the challenges that may give communities pause.

CODE: D
PRESENTATION TYPE: Technical
TITLE: Nature-Based Solutions: Statewide to Local Projects | **SUBMITTER**: Michele C. Eddy

With Nature-Based Solutions (NBS) increasingly supported in federal initiatives and funding opportunities and documented in resilience literature over the last two years, planning and implementation for different types and scales of NBS is coming to the forefront. The Louisiana Watershed Initiative (LWI), a statewide effort to address flood resilience through watershed management, is using a round of project funding focused on NBS to reduce the risk of flooding but also to bring hydrologic, ecologic, and economic co-benefits to the local and downstream watersheds. From opportunity mapping of locations both feasible and beneficial to implement NBS to development of an online modeling tool to assess both watershed and local project implementation to outreach support and training of stakeholders, RTI International and The Nature Conservancy are supporting LWI's effort to provide stakeholders with the necessary tools to plan and seek funding for NBS. Technical presentations will be followed by a panel discussion.

CODE: E
PRESENTATION TYPE: Technical
TITLE: Quantifying Forest Benefits for Water Supply in the Southeastern United States | **SUBMITTER**: Peter Caldwell

Forests and water are closely connected through complex physical, biological, ecological processes at multiple scales, providing numerous direct hydrological ecosystem services including drinking water to millions of Americans. However, these water-related ecosystem services are threatened by land use change, climate change, and other disturbances. Forest managers, land use planners, and water utilities need tools and data that quantify the importance and value of forests for maintaining clean and abundant water supplies.

This technical session supports the current and emerging issues conference theme by sharing recent research on a stakeholder-driven collaborative project, Keeping Forests, in which we link forests, water supply, and water treatment costs at the watershed to regional scale. We will discuss empirical and modeling studies, data, and tools investigating or demonstrating the role of forests in improving local and downstream water quantity and quality under natural and anthropogenic disturbances such as climate and land use change (e.g., urbanization).

CODE: F
PRESENTATION TYPE: Panel
TITLE: Reclaiming the Future | **SUBMITTER**: Robert Hopper

Reclaimed water is a valuable resource that lessens the amount of drinking water that ends up on lawns and other landscaping. Use of reclaimed water reduces the maximum daily demand from the water treatment facilities and increases the reliability of drinking water supplies. Join this session for a look at reclaimed water through the perspectives of three Piedmont communities (Cary, Raleigh, and Holly Springs).

CODE: G
PRESENTATION TYPE: Panel
TITLE: Integrated Portfolio Management | **SUBMITTER**: Lisa Beutler

This presentation focuses on Portfolio-Based Approaches to address the challenges being faced from diminishing water supply and increasing demand. During this session the panel will weave knowledge and data from past studies, best practices being used by agencies with similar challenges in other parts of the world, and innovative solutions that can be applicable to arid regions.

The presenters have performed a detailed review of 89 solutions aimed towards water supply conservation and augmentation. These solutions cover a range of parameters including magnitude (acer-foot/yr.), investments, both capital expenditures (CapEx) and operating expenses (OpEx), location, and time to first water depending on their nature and complexity.

Portfolio-Based approaches have been used widely across the infrastructure industry to when there are multiple demand variables and a wide collection of solutions. During the session the presenters will describe use of a a portfolio-based approach to address increasing water demands by evaluating each solution based on set screening criteria. Solutions including storm water capture, storage, emerging technologies, and reuse, are considered. Case studies on the approach are presented and an overarching practical framework to implement a programmatic portfolio-based strategy offered.

CODE: H
PRESENTATION TYPE: Panel
TITLE: What to do about Wicked Water Problems | **SUBMITTER**: Lisa Beutler

It's a rare day when water managers don't check the weather. And regardless of what the weather has historically delivered there has been a general faith that a technical solution exists for whatever problem it presents.And this has mostly been true. Planners and engineers crisply defined, understood, and fixed problems through technical solutions. It was not simple, yet problems were solvable. Either solutions worked or they didn't.

Lately, more and more water problems seemingly defy standard solutions. These are wicked problems. Wicked problems are often hot potatoes tossed back and forth among policy makers, and decried as too substantial for grand solutions. Wicked problems are not solved—they can only be mitigated. It is not possible to present an elegant solution and be done.

Horst Rittel, one of the first to formalize a theory of wicked problems, cites ten characteristics of these complicated social issues /Rittel, Horst. "Dilemmas in a General Theory of Planning." Policy Sciences, 1973: 155-169.: /

1. Wicked problems have no definitive formulation. The problem of poverty in Texas is grossly similar but discretely different from poverty in Nairobi, so no practical characteristics describe poverty.
2. It is hard, maybe impossible, to measure or claim success with wicked problems because they bleed into one another, unlike the boundaries of traditional design problems that can be articulated or defined.
3. Solutions to wicked problems can be only good or bad, not true or false. There is no idealized end state to arrive at, and so approaches to wicked problems should be tractable ways to improve a situation rather than solve it.
4. There is no template to follow when tackling a wicked problem, although history may provide a guide. Teams that approach wicked problems must literally make things up as they go along.
5. There is always more than one explanation for a wicked problem, with the appropriateness of the explanation depending greatly on the individual perspective of the designer.
6. Every wicked problem is a symptom of another problem. The interconnected quality of socio-economic political systems illustrates how, for example, a change in education will cause new behavior in nutrition.
7. No mitigation strategy for a wicked problem has a definitive scientific test because humans invented wicked problems and science exists to understand natural phenomena.
8. Offering a solution to a wicked problem frequently is a one shot design effort because a significant intervention changes the design space enough to minimize the ability for trial and error.
9. Every wicked problem is unique.
10. Those addressing a wicked problem must have authority and responsibility for their actions.

Managing wicked problems in a new kind of work. It requires changing the questions, managing uncertainty, and creating resilience. It does not solve existing problems but instead drives to a desired future state.

This session will consider how reframing water issues as wicked problems can help collectively move us forward to a healthy water future. The session will open with a general overview of the theory of wicked problems. Additional presenters will be invited to present on:

1. Considering issues and solutions at the system scale.
2. How to manage when water projects can no longer be solely the domain of the water community.
3. Adaptive and iterative approaches
4. Solutions that balance and reconcile tradeoffs while considering self-interests of the parties.
5. Reframing public perception

CODE: I
PRESENTATION TYPE: Technical
TITLE: Transboundary Water Management: Challenges and Opportunities | **SUBMITTER**: Avni Solanki

Managing shared waters presents unique challenges and opportunities, especially in the face of a changing climate. For this session, we invite abstracts at any jurisdictional level that address any aspect of transboundary water management: adaptive management governance, conflict resolution, data harmonization, modelling, communication, impact assessment etc. 2023 marks the 25th anniversary of the International Joint Commission's International Watersheds Initiative (IWI). This signature program supports binational, collaborative projects involving lakes and rivers, and their watersheds, across the transboundary region shared by Canada and the United States. It is one example of programs that exist to foster meaningful and effective transboundary water management. This session aims to highlight and share knowledge on transboundary water management at many levels.