



Zofnass Program Symposium

Water Infrastructure

Next Generation Planning Perspectives on
Urban Water Management

Feb 26-27, 2015

Zofnass Program Symposium

Water Infrastructure Next Generation Planning Perspectives on Urban Water Management

Feb 26, Thurs -Feb 27, Fri

Location: Room 112 (Stubbins) Harvard Graduate School of Design,
Gund Hall, 48 Quincy St. Cambridge, MA 02138

The Zofnass Program for Sustainable Infrastructure aims to influence the practice of sustainable city planning through an infrastructure-based approach, towards sustainable and resilient development of our communities. Infrastructure is re-examined through a systemic and synergistic approach of the Zofnass Planning Tool, as well as through an assessment-based approach of the Envision™ Rating System, the result of a joint collaboration with the Institute for Sustainable Infrastructure.

Overall, the Zofnass Planning Tool attempts to redefine traditional practices for planning urban infrastructure systems through analytical processes and information-driven approaches with the purpose to optimize the contribution and interaction of various experts. The traditional definition of infrastructure mainly addresses energy, transportation, water, and waste systems. This approach extends our understanding of infrastructure to include landscape, food and information systems ultimately compiling seven infrastructure types. This planning approach complements the Envision™ Rating System through “reverse engineering” of infrastructure components or projects. Envision™ is a holistic framework with its own toolbox for evaluating all types and sizes of infrastructure projects that use transformational, collaborative approaches to assess the sustainability indicators over the course of the project’s life cycle.

This symposium is a collaborative platform that will bring together public officials, infrastructure engineers, planners, design professionals and academia to share “next generation” perspectives on urban water management. The Zofnass methodology and application examples on sustainable water infrastructure planning will be presented during the symposium, as a prospective framework for integrated planning and collaboration. The Zofnass approach defines water infrastructure as an integrated system of water supply, water consumption, wastewater & stormwater. Speakers will position their talks within the urban realm, effectively establishing clear implications of their topics to the urban form. This is a key aspect to triggering interesting panel discussions on the larger discourse of the Resilience of Urban Water Management.



LEADERSHIP



QUALITY OF LIFE



RESOURCE ALLOCATION



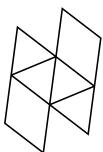
NATURAL WORLD



CLIMATE AND RISK



(www.zofnass.org)



Harvard University
Graduate School of Design

BRIEF AGENDA

Thursday, February 26, 2015 - 12pm to 6:00 pm

PANEL 1 (12:15 pm-3:00pm)

Systems Level Approach to Water Infrastructure Planning

Spiro Pollalis, Director, Zofnass Program & Professor of Design, Technology and Management at Harvard GSD, **Doug Owen**, Exec. VP and Chief Technical Officer, Arcadis, **Laura Bonich**, Director of Business Development, NV5, **Art Umble**, Wastewater Practice Leader, MWH, **Floren Poliseo**, Director of Watershed Planning & Modeling, NYCDEP, **Richa Shukla**, Research Associate, Zofnass Program.

PANEL 2 (3:30pm-6:00 pm)

Sustainability Framework and Approaches for Planning of Water Infrastructure

Marty Janowitz, Vice President, Practice Leader Sustainable Development, Stantec, **Bill Bertera**, President & CEO, Institute for Sustainable Infrastructure, **Robert Page**, Project Manager, HNTB, **Clint Cantrell**, Global Sector Lead – Wastewater and Stormwater Planning, MWH, **John Wise**, Managing Principal, Stantec, **Mead Mier**, Watershed Planning Lead, Pima Association of Governments.

Friday, February 27, 2015 - 9:00 am to 3:45 pm

PANEL 3 (9:10 am-12:00 pm)

Valuing Green Infrastructure

Scott Davis, Senior Advisor in the Office of Community Planning and Development, US HUD, **Newton Tedder**, Environmental Scientist, Lead MS4 permit writer for MA & NH, US EPA-Region1, **Paul Gallay**, President, Riverkeeper, **Joel McKellar**, Associate Director –Green Building Services, Harvard University Campus Services, **Anthony Kane**, Vice President of Research & Development, Institute for Sustainable Infrastructure.

PANEL 4 (1:00pm-3:15pm)

Next Generation Practices

Andreas Georgoulis, Research Director, Zofnass Program & Lecturer, Harvard GSD, **Cristina Contreras**, Research Associate, Zofnass Program, **Judith Rodriguez**, Research Associate, Zofnass Program, **Elvio Zaghi**, Principal, Water, Stantec, **Terry Bennett**, Senior Industry Program Manager, Autodesk, **Erin Mosely**, Vice President, Director of Management Consulting, CH2M Hill.

Format: Within every session each speaker will give a 10-15 mins presentation, followed by 1 hr panel discussion.

DETAIL SCHEDULE FEB 26, THURS

Room 112, Stubbins

12:00 pm- 12:30 pm

Welcome and introductions *(Light snacks and coffee setup in stubbins from 12:00 pm)*

Systems Level Approach to Water Infrastructure Planning

12:30 pm-12:40 pm Panel Introduction, Richa Shukla, *Research Associate, Zofnass Program*

12:40 pm-1:00 pm

Water Management and Urban Planning

Prof. Spiro Pollalis, *Director of Zofnass Program, Professor of Design, Technology and Management, Harvard GSD*

The Zofnass Planning Guidelines aim to provide an analytical framework for achieving urban sustainability, integrating infrastructure and urban planning to ensure efficiency, high living standards, and resiliency. Urban infrastructure and the Planning Guidelines are organized into seven basic systems: Transportation, Landscape, Water, Energy, Solid Waste, Information, and Food. Classification does not mean separation as the systems are considered to function in synergy.

Water infrastructure provides for the treatment, collection and distribution of potable water, rainwater and wastewater. A watershed approach is emphasized, supporting and protecting the natural systems that offer the water supply but also allow for natural filtering and drainage. Water management is closely connected to natural processes, and as such, has a strong synergy with Landscape infrastructure.

Landscape provides an alternative, soft, flexible infrastructure with the inherent potential of multi-functionality. Apart from its cultural and aesthetic value, Landscape can support specific "infrastructural" services, offering biological solutions to technical problems, especially if treated in synergy with other infrastructure systems. All six of Landscape's main functions, habitat, source, sink, conduit, filter and barrier, can be used to improve the efficiency, resiliency and environmental performance of Water infrastructure.

1:00 pm-1:15 pm

Changing the Paradigm of Available Water Resources to Enable a Sustainable Water Future

Douglas M. Owen, *PE, BCEE ENV SP; Executive Vice President and Chief Technical Officer, ARCADIS*

Increasing population and its associated agricultural and other economy-based stresses have strained the natural water cycle immensely. Traditional assumptions need to change dramatically to achieve a sustainable water future. A broadened understanding of available water resources, to include fit-for-purpose water reuse and local replenishment of groundwater resources through green infrastructure, is critical to meet changing water demands in resource constrained areas affected by population growth and climate change. Although historically water often has been transported far distances to meet the needs of large population centers remote from the source, the increasing demand for that water coupled with potential shortages from changing climatic conditions drive the need for urban centers to take a more locally-based watershed approach, to increase both independence and resilience.

The premise that the collection and treatment of wastewater treatment is solely to reduce disease in urban areas and maintain fishable and swimmable conditions in water bodies must evolve. From a water supply perspective, wastewater became a water resource for planned, non-potable uses many decades ago. But now, planned indirect and direct potable reuse applications are flourishing. Indeed, in some water short areas, wastewater is the only reliable resource. For too long, we also have not been creative about how we managed stormwater and neglected the opportunity to recharge local groundwaters – groundwaters that have become more and more depleted as we continually look to available resources for growing demands. Finally, we can look to the oceans and to previously-undeveloped brackish groundwater. Where concentrate disposal options are available, seawater desalination and brackish water desalting remain options to diversify water supply. In the end, water sources should be diverse, fit-for-purpose, and renewable using infrastructure that is adaptive, multi-functional, and reinforcing of water sensitive behaviors.

1:15 pm-1:30 pm

Water Conservation and Maximizing Efficiency of Existing Water Infrastructure

Laura Bonich, *Director Business Development, NV5*

Water is a finite resource that will limit development/redevelopment and growth/densification in many areas of the U.S. Indoor and outdoor water efficiency can significantly reduce water supply and wastewater treatment requirements. New codes and voluntary rating systems are requiring water efficiency in many places, however the traditional infrastructure systems that treat and deliver water, and convey and treat wastewater are regulated locally by individual cities and water districts and generally have design criteria based on historic water use (whose design criteria and standards were often adopted 30+ years ago). Indoor water efficiency can easily reduce per person indoor water use to 40 gpcd for all new/re-development with low flow fixtures and water efficient appliances. While many new projects build water efficient homes and buildings, the assumptions and design criteria for construction of water and waste water infrastructure (or evaluation of existing capacity) is not based on the accurate water demands. We must focus water and wastewater master planning for the next 20 to 50 years on realistic projections that include indoor and outdoor water conservation requirements. Reducing per person water use can create capacity in existing systems and significantly reduce the huge infrastructure burden associated with additional capacity. We need to understand the magnitude of the opportunity to reduce water use in the US and the implications for how we fund and operate our integrated water infrastructure as a result. We are successfully influencing the design of vertical construction – now it's time to influence the design of the traditional infrastructure.

DETAIL SCHEDULE FEB 26, THURS

1:30 pm-1:45 pm

Achieving the “One Water” Culture: Is it Realistic for Us Today?

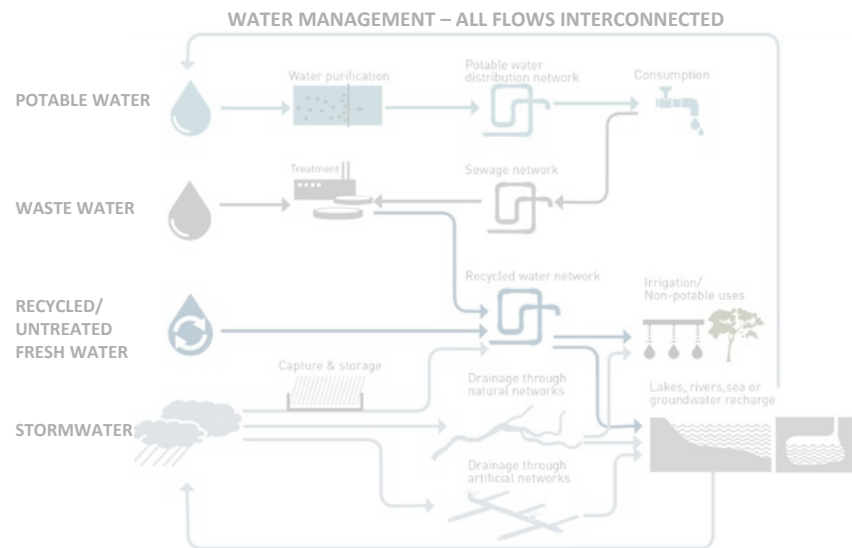
Art Umble, Wastewater Practice Leader, MWH Global

The recent reports across a diversity of media and scientific literature on the increasing frequency of droughts and floods, together with sea level rise, remind us of the complexity of water resource availability. Going forward, integrated urban water management is needed that merges traditional functions within a watershed and promotes coordinated planning and development. Water security within the complex interdependencies between urban, agricultural and environmental demands is pointing toward a new, rapidly evolving paradigm for water as a resource. It means embracing the “one water,” which integrates public health, supply security, environmental restoration and protection, flood control, community amenities, livability and economic sustainability.

This concept sounds good, but can it be a reality? How do we make it something whereby every person’s daily activities directly contribute to creating our “one water” culture? At the heart of “one water” is our **awareness** of how much water we actually consume to sustain the lifestyles we have come to expect. That awareness defines the “value” of the water we use; value grows when water is less available to support the product or activity that we desire.

One pragmatic way to establish value is “water footprinting.” This assesses the total volume required to generate the products, goods and services we produce and consume daily. Unlike carbon, water’s extraction and use result in direct impacts specific to the very region from which it was withdrawn. Our water footprint is tightly coupled to “virtual” or “embedded” water, i.e., the total volume consumed along the entire supply chain of a product’s journey from cradle-to-grave. Embedded water makes up the largest fraction of our water footprint, and yet, so few are aware of it. When accounted for, this significantly escalates water’s true value.

Achieving a “one water” culture faces significant institutional challenges. Regulatory frameworks are fragmented around different parts of the water cycle, which “silos” the management of water. Political, legal, financial and social barriers all inhibit progress toward “one water.” But improvements are possible. These include goal-oriented, collaborative legislation and regulations, integrated governmental organizations across the array of the full supply chain of water demands, changing cultural norms associated with the value of water (as it relates to human, agricultural and environmental uses), and increasing community engagement to allow a new dialogue on solutions that require reductions in water demand coupled with sustainable solutions for supply.



1:45 pm-2:00 pm

NYC Stormwater Management Programs

Floren Poliseo, Director, Watershed Planning & Modeling,

NYC Department of Environmental Protection (DEP), Bureau of Environmental Planning & Analysis

The New York City Department of Environmental Protection (DEP) protects public health and the environment by supplying clean drinking water, collecting and treating wastewater, and reducing air, noise, and hazardous materials pollution.

This presentation will provide an overview of the myriad stormwater-related programs DEP implements, both unaided and in partnership with other NYC agencies. For decades, DEP has held SPDES General Discharge Permits and individual permits for our wastewater treatment plants with the York State Department of Environmental Conservation (NYS DEC).

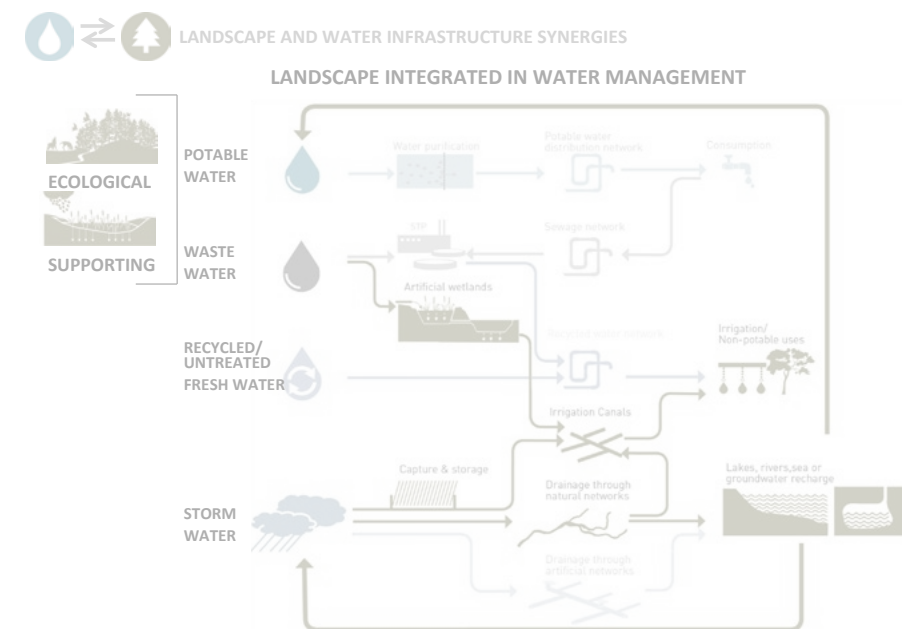
DEP has a long history of developing programs to prevent and mitigate combined sewer overflows to improve water quality in the City’s surrounding water bodies. Some are driven by consent order, while others are ongoing programs and initiatives DEP and other City agencies have voluntarily developed as effective measures to meet both public and municipal needs. These practices are both structural and institutional, ranging from outreach campaigns to water-side monitoring, to green and grey infrastructure.

NYS DEC New will soon issue a Phase 1 Municipal Separate Storm Sewer System (MS4) Permit to the City, to address stormwater-only discharges from areas in which stormwater and sanitary wastewater are separated. Although the City already has many relevant programs in place that it may combine, modify, or enhance to help comply with the new permit’s required Stormwater Management Program (SWMP), this permit will significantly expand the City’s obligations to reduce pollutant discharges. This presentation will provide more information and examples of specific stormwater management and resiliency programs and initiatives relevant to the above topics.

DEP’s infrastructure and asset management and capital planning strategies consist of long term planning, alternatives analyses, resiliency planning, risk analyses, and capital program management. The imminent issuance of an MS4 permit will complement ongoing CSO efforts to protract this integrated thinking toward comprehensive stormwater planning that addresses discharges to our surrounding waters from both combined and separately sewered areas.

2:00 pm-3:00 pm Panel Discussion moderated by Richa Shukla

3:00 pm-3:20 pm Break



DETAIL SCHEDULE FEB 26, THURS

Room 112, Stubbins

Sustainability Framework and Approaches for Planning of Water Infrastructure

3:30 pm-3:40 pm Panel Introduction, Marty Janowitz, *Vice President Sustainable Development, Stantec*

3:40 pm-3:55 pm

Sustainable Water Infrastructure; Why and How it Matters

Bill Bertera, *President & CEO, Institute for Sustainable Infrastructure*

Water and its availability are critical to sustainable communities. Global warming, climate change and unpredictable weather patterns jeopardize both nation states and civilizations. Envision can help us plan for a future with both water and sanitation capacity to meet growing and changing needs.

3:55 pm- 4:10 pm

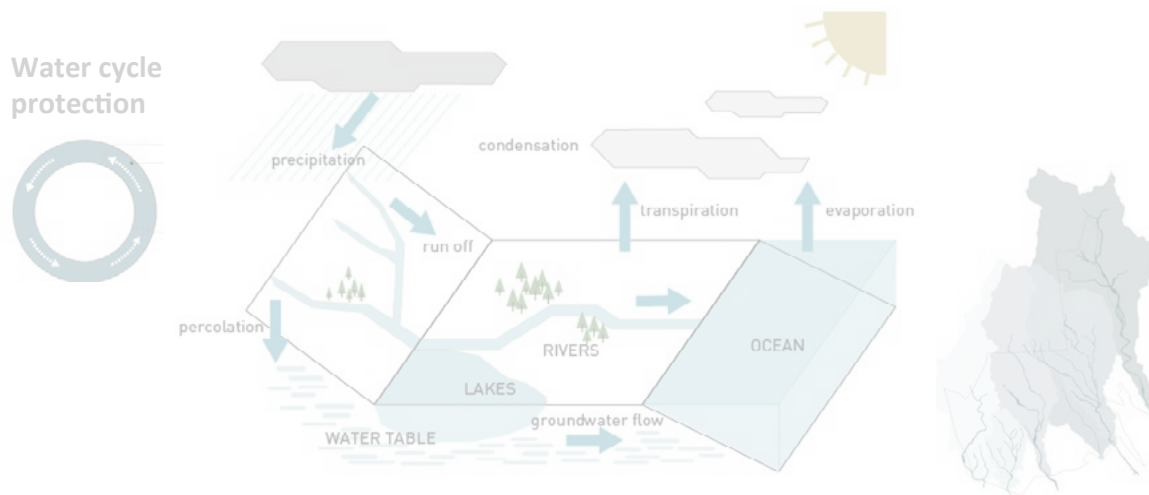
Source Reduction of Waste and Resource Recovery of Water for the City of Muncie

Robert Page *Project Manager, HNTB Corporation*

Urban storm water management continues to cause municipalities across the country significant problems. In particular, combined sewer communities often see trouble with cost-effectively managing storm water. Cost effective and sustainable solutions are needed for these communities to manage storm water. Presentation will utilize examples from the City of Muncie, Indiana long term control plan analysis/integrated planning efforts.

Combined Sewer/Storm water management hierarchy:

- On-site treatment: Green Infrastructure
- On-site treatment: Grey Infrastructure
- Transport for treatment



4:10 pm-4:25 pm

Optimizing Use of Wastewater Assets for Urban Stormwater Pollution Management

Clint Cantrell *Global Sector Lead - Wastewater and Stormwater Planning, MWH Global*

The very first sewer systems were designed to convey both wastewater and stormwater, known as "combined sewer systems". These systems were designed to convey all of the wastewater occurring in dry weather conditions to a facility for treatment, and a portion of the combined sewage occurring in wet weather conditions. During storm events, combined sewer systems discharge a dilute mixture of untreated wastewater and stormwater at designed overflow points. Starting in the 1960s, separate systems were constructed to convey wastewater and stormwater with the idea that all sewage would be treated and "cleaner" stormwater would simply be discharged. In almost all cases the separate wastewater systems incurred stormwater inflow and infiltration from various leaks, defects and improper connections resulting in overflows similar to combined systems. As a result of this there has been a strong push to eliminate the presence of stormwater from separate sewer systems to prevent pollution from untreated overflows. However, recent studies have shown that pollution from urban stormwater runoff can greatly exceed pollution from wastewater overflows. Effective treatment of stormwater in highly urbanised areas is challenging both in terms available land space, technology, cost and maintenance. Furthermore, studies have shown that pollution from the initial flush of stormwater after long periods of dry weather can result in the most severe environmental and community impacts. It is during these times that wastewater collection systems typically have available capacity to convey flows for treatment. Somewhat counter-intuitive to the movement for elimination of stormwater from wastewater systems, optimising the use of available wastewater conveyance and treatment capacity to address first flush stormwater pollution from "hot spot" urban sources offers a potentially cost effective means to improve environmental conditions and reduce public health risks.

4:25 pm- 4:50 pm

Evaluation of GI/LID Benefits in the Desert Environment - Pima County, AZ

John Wise, *Managing Principal, Stantec*

Mead Mier, *Watershed Planning Lead, Pima Association of Governments*

Urban areas are experiencing rising temperatures with negative consequences for human health. The population in southeastern Arizona is growing while renewable water resources are diminishing due to drought across the Colorado River Basin, despite leadership in water efficiency and re-use. Pima County Regional Flood Control District (PCRFCDD), City of Tucson and Pima Association of Governments (PAG) have been collaborating to provide a framework for how our community can plan and adapt to become more climate resilient by using stormwater through Low Impact Development (LID) and Green Infrastructure (GI).

The local LID Guidance Manual was created with Stantec for professionals to better understand designs and benefits of GI/LID practices for stormwater management. Benefits include stormwater pollutant purification, flood reduction, urban heat mitigation, traffic calming, potable irrigation offsets and property value enhancement. Quantified economic, environmental and social returns on investment of GI/LID are important additions to the LID Manual to encourage adoption of best practices by both private and public sectors.

In 2014, Impact Infrastructure (II) performed the analytical analysis on several GI/LID features from the LID Manual while Stantec provided design input and local research compilation. Two sample sites were also studied, a commercial site and a road re-design. Benefits of GI/LID are framed through the ISI Envision™ framework and monetized in the AutoCASE™ for Stormwater Management (beta) software (an automated business case analysis tool developed by II LLC).

The business case analysis provides a comprehensive assessment of the value to the community, government, and the environment; further articulated with reference to Envision's™ five sustainable infrastructure categories. These investments pay back in more than cash terms with benefits to a wide range of stakeholders whereas traditional grey infrastructure showed negative net present value. The project has aided decision making region-wide for feasible resiliency planning.

4:50 pm- 6:00 pm: Panel Discussion moderated by Marty Janowitz

7 pm Zofnass SIAB member dinner, Harvard Faculty Club. *Invitation only*

DETAIL SCHEDULE FEB 27, FRI

Room 112, Stubbins

8:00 am- 8:45 am Zofnass SIAB breakfast meeting

Light Continental breakfast for all attendees in Stubbins from 8:45 am

Valuing Green Infrastructure

Green infrastructure has become a hot new buzz-phrase in urban stormwater management circles. A clear definition for this term, however, remains elusive. Moreover, we are still determining how to project the effectiveness of green infrastructure projects in slowing stormwater run-off and preventing pollutant loading of our waterways, and to monitor their performance in different settings. Until we learn how to truly value GI, implementation of this method of urban stormwater management will face obstacles and the potential for this design approach will not be realized.

This panel will explore why we need to better value GI. We will hear from federal agencies about their need to understand GI and its performance, to meet permit requirements, federal funding cost-benefit requirements, and climate resilience goals. A prominent environmental organization will discuss the need to document GI's ability to meet water quality standards in surface waters. And, a finance expert will relate the information needed about GI to attract private investment in this work, based on experience structuring creative financing arrangements for public sector energy efficiency projects.

This panel will then turn to how we can better value GI. We will discuss emerging standards in the industry, and efforts to measure and monitor the impact of GI on storm water management, water quality, protection from storm surge and sea level rise, and on other community benefits. We will also discuss next steps in making the case for GI.

Anthony Kane from the Institute for Sustainable will moderate this discussion, responding to the issues raised by the panelists and layering on the ENVISION infrastructure rating system as an approach for the data collection and evaluation necessary to quantify the value of GI to the urban landscape.

9:15 am -9:25 am

Panel Introduction, Anthony Kane, *Vice President of Research and Development, Institute for Sustainable Infrastructure*

9:25 am-9:40 am

Scott Davis, *Senior Advisor in the Office of Community Planning and Development (CPD), U.S. Department of Housing and Urban Development (HUD)*

9:15 am -9:25 am

Newton Tedder, *Environmental Scientist, USEPA Region 1*

9:55 am -10:10 am

Paul Gallay, *President, Riverkeeper.*

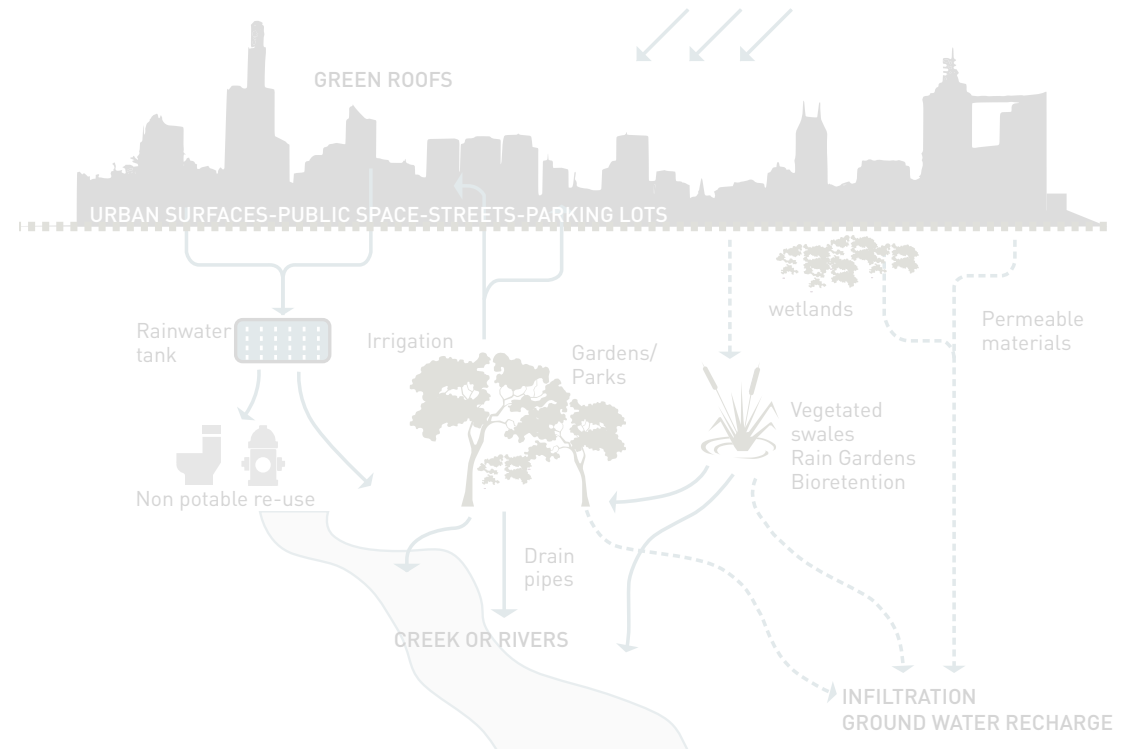
10:10 am - 10:30 am Break

10:30 am -10:45 am

Joel McKeller, *Associate Director, Geen Building Services at Harvard University*

10:45 am-12:00 pm: Panel Discussion moderated by Anthony Kane

Special thanks to **Kate Konschnik**, *Director, Harvard Law School, Environmental Policy Initiative & Aladdine Joroff*, *Staff Attorney and Instructor, Harvard Law School, Emmett Environmental Law & Policy Clinic* for organizing this panel.



12:00 pm-12:45 pm: Lunch in Porticos room 121-123 for all attendees.

DETAIL SCHEDULE FEB 27, FRI

Room 112, Stubbins

Next Generation Practices

1:00 pm- 1:10 pm Panel Introduction, Andreas Georgoulis *Research Director, Zofnass Program & Lecturer in Architecture, Harvard GSD*

1:10 pm - 1:25 pm

Synergies of Water, Waste and Energy Infrastructure

Cristina Contreras, *Research Associate, Zofnass Program, Harvard Graduate School of Design*

Judith Rodriguez, *Research Associate, Zofnass Program, Harvard Graduate School of Design*

Sustainability is at its core when the use of water is combined with wastewater reuse and energy generation. This presentation will address innovative issues, as well as barriers to implementation, of synergistic approaches in water infrastructure through the examples of two projects in Brazil. The Aquapolo Water Reuse Treatment Plant in Sao Paulo, and the Santo Antonio Hydroelectric Plant near Porto Velho represent sustainable water management for wastewater treatment, water supply, and energy production. The synergistic approach to water infrastructure is exemplified through the projects' best practices in planning and management of water resources, wastewater and energy generation in urban areas. In addition, project impacts to the environment and the nearby communities are assessed and mitigation and compensation measures are developed, towards a balanced and sustainable approach.

1:25 pm-1:40

Designing with Envision™ – a Best Practices, Next Generation Approach?

Grand Bend Area WWTF Case Study

Elvio Zaghì, *Principal, Water - Stantec Consulting*

Two smaller semi-rural municipalities in Southwestern Ontario (South Huron and Lambdon Shores) needed to upgrade and enhance their shared wastewater treatment facility. They were interested in doing so in a progressive and sustainable fashion but the first design attempt presented a flagship project that was way too expensive and focused more on bells and whistles than practical efficiency. Stantec was hired to take a second look and undertake a re-design with the dual objectives of lower cost while still maintaining exemplary sustainability values. Midway through the design work the team decided with client's acquiescence to deploy the Envision™ sustainable infrastructure framework to focus and integrate the process. Now the Grand Bend WWT will be the first Envision™ credentialed waste water treatment plant in North America and first Envision™ project in Canada.

Envision™ played a tangible role influencing design decisions. Some of the things that we did differently as a result of Envision™ included making additional efforts to eliminate invasive species, developing educational programing and communicating facility related opportunities to local schools, shifting the text of some of the design specifications to require contractors to meet specific requirements of Envision™ (i.e. SRI rating of gravel), additional efforts to identify suppliers that had sustainable practices of their own. Additionally there were features that the project team was already working on that 'meshed' with and were reinforced by the framework – most notably the features related to redundancy, flexibility, and durability (essentially the plant is designed to be 'modular', in that it can easily be expanded in the future to meet changes in demand without significant additional cost). Although we were not able to completely influence the design as Envision™ was not initiated at project outset, we were able to make quite a few positive changes even with limited influence on the beginning phases.

1:40 pm-1:55 pm

"The Human City – Strategies for Sustainable and Future Proofed Water Systems"

Terry Bennett, *Senior Industry Program Manager, Civil Infrastructure, Autodesk*

Cities and their infrastructure systems are much like the human body, a complex "systems of systems". Unfortunately today these infrastructure systems are built for the normal day to day with each infrastructure system often developed in a silo, with no clear plan of how they should work together to respond to, recover from or insulate us from stressor events. While our bodies are built to adapt to changing environments and conditions, infrastructure is often thought of as static.

With the rise of big data, simulation, analytics, and cloud based infinite computing power, the role of infrastructure designers fundamentally changes. No longer is the question "Are we designing these systems right." In this connected era we now must start to answer the more important question: "Are we designing this systems to come to life?"

This presentation will focus on smart water systems and discuss approaches and next generation practices to not only better understand how they can support sustainable & resilient communities, but to also look into technologies for greater sustainable performance helping to future proof our cities and their infrastructure systems.

1:55 pm-2:10 pm

Fearless Organizational Commitment to Sustainable Water Infrastructure

Erin Mosely, *Vice President, Director of Management Consulting, CH2M HILL*

A commitment to sustainable infrastructure requires significant culture change and appropriate governance models to ensure clear responsibility and accountability. Through a facilitated and integrated approach, organizations can redefine:

- Functions ('how' a sustainable infrastructure program is delivered)
- Organizational structure ('who' delivers it)
- Baseline ('what' is part of it)

Achievement (through effective tools to track outcomes and control the program delivery)
Making this commitment is the first step to becoming a high-performing organization. More than the standard hierarchical boxes on a page, such an organization sees itself as an intricate system that must continually evolve to stay vibrant and successful in its mission. To perform effectively, these organizations ensure multiple information channels and reliable data to drive decision-making. They set performance measures that align full life-cycle operations to their organizational priorities. They establish structures that support cross-functional collaboration and a work culture that inspires innovation as well as reliability. They use appropriate technologies and streamlined processes that make sense, and they invest in capable and informed employees who can effectively deliver infrastructure programs that achieve restorative outcomes.

Many organizations fail to recognize that these cultural and governance changes are critical prerequisites in achieving their sustainability goals. This presentation will introduce the concepts of organizational agility and resilience, structuring for success, optimized work processes & operations, and sustained high performance as critical elements of sustainable urban water planning and management.

2:10 pm-3:15 pm: Panel Discussion moderated by Andreas Georgoulis

3:15 pm: Closing Remarks, Prof. Spiro Pollalis

SPEAKER BIOS

Terry D. Bennett, LS LFP MRICS ENV SP LEED AP,
Senior Industry Program Manager, Civil
Infrastructure, Autodesk

Terry D. Bennett, is the senior industry program manager and lead strategist for civil infrastructure at Autodesk. He is responsible for setting the company's future vision and strategy for technology serving the planning, surveying, civil engineering and heavy construction industries, as well as cultivating and sustaining the firm's relationships with strategic industry leaders and associations. Bennett has been a practicing professional for close to 30 years and is a global author and lecturer on the impact of technology to the infrastructure and urban planning industries focusing on sustainable approaches to urban infrastructure development. He currently serves as a Board Member of Harvard's Graduate School of Design's Sustainable Infrastructure Advisory Board, is a charter member of the Institute of Sustainable Infrastructure and a member of its economics committee, and is a council member on the Urban Land Institute's Public Development and Infrastructure Council. Additionally Bennett is an editorial Advisory Board member of Informed Infrastructure magazine, and was a founding editorial board member of Rebuilding America's Infrastructure magazine.

William J. Bertera

President & CEO, Institute for Sustainable
Infrastructure

President and CEO of the Institute for Sustainable Infrastructure. He is the former Executive Director of the Water Environment Federation, the Rebuild America Coalition and the American Public Works Association. He has also held senior management positions with the International City Management Association, the National Association of Counties and the National Solid Wastes Management Association.

Laura Bonich, PE LEED AP

Director Business Development, NV5

Laura has worked for NV5 since 1994 where she directs the Sustainability Practice and provides strategic approaches to all aspects of infrastructure master planning, emphasizing an integrated process for water use and water resource planning. Laura has advanced goals for the sustainable optimization of infrastructure recommending for best practices that help reduce potable water use and wastewater generation as a complement to programs to reduce outdoor water use on large public and private projects throughout the United States. She further emphasizes the financial impacts of implementing sustainability to reduce traditional infrastructure and site development costs. Laura is a registered civil engineer, LEED AP, is a member of the Harvard Graduate School of Design Sustainable Infrastructure Advisory Board, Member of the Institute for Sustainable Infrastructure National Technical Committee for the Envision rating system, full member of the Urban Land Institute, past branch president of ASCE and holds a Masters in Business Administration.

Clint Cantrell, PE

Global Sector Lead – Wastewater and Stormwater
Planning, MWH Global

Clint Cantrell, P.E. serves as Global Sector Leader for Wastewater and Stormwater Planning Engineering and is based in Auckland, New Zealand. Originally from the US, Mr. Cantrell has lived and worked around the globe primarily focused on urban drainage management projects and programs. His areas of technical expertise include wastewater and stormwater collection and treatment systems, and strategies for managing pollution from highly urbanised areas that occurs in wet weather conditions. Mr. Cantrell has served as the technical director and project manager on some of the largest and most complex urban drainage studies around the world, and is actively serving as a technical expert in various global locations such as Sydney, San Francisco, Brisbane, Auckland, Christchurch and Fiji on issues pertaining to wastewater and stormwater pollution.

Cristina Contreras Casado

Research Associate,
Harvard University Graduate School of Design

Cristina Contreras is currently a Research Associate in the Zofnass Program for Sustainable Infrastructure at Harvard University, Ms Contreras is in charged of the research team for the Infrastructure 360 Awards initiative sponsored by IDB. Her work focuses on promoting sustainable practices in infrastructure projects on a global scale, examining and exploring the challenges and opportunities that sustainability can provide to countries and companies. Her main areas of interest are sustainable management and development focus in large scale infrastructure projects. She has presented her work on assessing sustainable infrastructure at several international conferences, and was a lecturer in the School of Civil Engineers at Polytechnic University of Madrid and a Teaching Fellow at Harvard University Graduate School of Design. Ms Contreras is an accredited Envision Sustainability Professional (ENV SP), and a certified Envision trainer by the Institute of Sustainable Infrastructure (ISI) in Washington DC. She holds a Diploma in Technical Architecture and Building Engineering, both from the Polytechnic University of Madrid (UPM) as well as a Bachelor in Architectural Technology and Construction Management at the Kovenhavns Tekniske Skole in Copenhagen. She is the recipient of several awards, and she speaks English and Spanish.

Paul Gallay

President, Riverkeeper

Paul and the Riverkeeper team work to protect the Hudson River and the drinking water supplies for nine million New Yorkers. An attorney and educator, Paul has dedicated himself to the environmental movement since 1987, when he left the private practice of law and went to work for the New York State Attorney General. In 1990, Paul began a ten-year stint at New York's Department of Environmental Conservation, where he brought hundreds of corporate and government polluters to justice. Paul subsequently spent a decade in the land conservation movement before becoming Riverkeeper's President in 2010. Paul is a graduate of Williams College and Columbia Law School and has held a number of teaching positions, including his current appointment with The Beacon Institute/Clarkson University.

SPEAKER BIOS

Scott G. Davis

Senior Advisor in the Office of Community Planning
and Development (CPD), U.S. Department of Housing
and Urban Development (HUD)

Scott currently serves as a Senior Advisor in the Office of Community Planning and Development (CPD) at the U.S. Department of Housing and Urban Development (HUD). He has been with the Department since 2009, recently serving as a Senior Advisor in the Office of the Secretary and on the President's Hurricane Sandy Rebuilding Task Force. Prior to Hurricane Sandy, he served as Director of HUD's Disaster Recovery Division, where he managed the Department's portfolio of Community Development Block Grant Disaster Recovery (CDBG-DR) funds – which now totals more than \$45 billion. Scott joined the federal government following the Gulf Coast Hurricanes of 2005. Prior to joining HUD, Scott served as Policy Director for the Office of the Federal Coordinator for Gulf Coast Rebuilding housed within the U.S. Department of Homeland Security (DHS). Prior to his federal service, Scott served as Director of Programs for the Economic and Community Development Institute in Columbus, Ohio and as Director of the Office of Economic Development at The University of Arizona in Tucson. He is a member of the American Institute of Certified Planners and holds degrees in Regional Development and Environmental Planning.

Andreas Georgoulis

Research Director, Zofnass Program & Lecturer in
Architecture, Harvard GSD

Prof. Andreas Georgoulis is the research director of the Zofnass Program for Sustainable Infrastructure at Harvard University Graduate School of Design, where he also teaches since 2007. His work focuses on infrastructure and large-scale developments, where he has published two books and continues to develop methods and tools to evaluate their environmental, social and economic impacts. His current projects include the Infrastructure 360 Awards, the first sustainability assessment and recognition program in Latin America in collaboration with the IDB, a wide interdisciplinary effort to assess health impacts of cities in Asia, and research on hybrid models of waste-to-energy facilities. He is the lead developer of the Zofnass Economic Tool, a comprehensive analytic model that quantifies the external costs and benefits of sustainable infrastructure. He has collaborated with Obermeyer, Hochtief and the US General Service Administration, and in infrastructure financing with UniCredit Markets and Investment Banking. He has consulted for the Economist Intelligence Unit and the United Nations Development Program, and led feasibility studies for new city developments in Cameroon, Saudi Arabia and Pakistan. Prof. Georgoulis holds degrees in Architecture Engineering from the University of Athens, a Master's and a Doctorate from Harvard.

Martin W. Janowitz M.E.S., ENV SP Verifier
Vice President Sustainable Development,
Stantec Consulting Services Inc.

Marty Janowitz is Vice President, Sustainable Development at Stantec. He has more than 30 years' experience consulting internationally in environmental and sustainability planning, policy and engagement. He's responsible for guiding Stantec's efforts to become an exemplary model of sustainability in all its operations and leads the company's initiatives to develop an integrated sustainability consulting practice. He's played a leading role in the sphere of sustainable infrastructure serving on the Zofnass Program's Sustainable Infrastructure Advisory Board. He's an Envision Professional, Verifier and Trainer, was Chair of an ISI Technical Committee and is a member of its new Envision Review Board. He was advisor to Stantec's Envision Platinum Grand Bend Wastewater treatment project – the first such project first and first Envision project in Canada. Marty was elected a member of Canada's Clean 50 – outstanding contributors to sustainable development and clean capitalism.

Anthony Kane

Vice President, Research and Development.
Institute for Sustainable Infrastructure

Anthony Kane is Vice President of Research & Development at the Institute for Sustainable Infrastructure in Washington, DC where he oversees and directs the research and further development of the Envision rating system for sustainable infrastructure. His work has focused primarily on sustainability in the built environment and advanced fabrication methods. He is a contributing author of Infrastructure Sustainability and Design and has published articles for the International Symposium on Automation and Robotics in Construction (ISARC). His work is also featured in Fabricating the Future published by Tongji University. Kane is formerly a research director at the Zofnass Program for Sustainable Infrastructure at Harvard University's Graduate School of Design, a research associate with the Materials, Processes, and Systems Group at Harvard University, and an instructor at the Boston Architectural College. Kane holds a Bachelor of Architecture summa cum laude from Virginia Tech and a Master in Design Studies from the Harvard Graduate School of Design.

Joel McKellar, CBCP, LEED AP

Associate Director - Green Building Services, Harvard
University Campus Services

Joel McKellar is the Associate Director of Harvard Green Building Services, a group of engineers and architects enabling sustainable new construction and existing building efforts at Harvard through energy audits, facility commissioning, capital project consulting, and overall support for Green Building Standards implementation.

SPEAKER BIOS

Mead Mier

Watershed Planning Lead, Sustainable Environment Program; Pima Association of Governments

Mead runs the PAG regional Stormwater Managers Working Group coordinating discussions on incorporating low impact design into construction practices, watershed management, water resource planning, local policy, pollution control and public outreach. Mead has 12 years of experience working in the academic and public sectors covering conservation ecology and watershed planning. She is an advocate for community livability issues and desert riparian ecosystems which have been all but lost due to groundwater pumping and drought over the last century. PAG has been assisting the region through aerial mapping tree canopy to better identify potential vulnerable neighborhoods.

Erin Mosley

Vice President, Director of Management Consulting, CH2M HILL

Erin Mosley currently serves as Vice President and Director of Management Consulting for CH2M HILL, working with clients across the water, transportation, facilities, urban environments, and energy sectors. She also serves as a member of the Water Environment Federation Board of Trustees and on the Harvard Zofnass Program Sustainable Infrastructure Advisory Board. Erin received a B.S. in Civil Engineering from Northeastern University (Boston, Mass.), and completed graduate coursework at Tufts University (Somerville, Mass.) and the Harvard Extension School (Cambridge, Mass.). She is a professional engineer and an Envision™ Sustainability Professional and Trainer.

Douglas M. Owen, P.E, BCEE, ENV-SP

Executive Vice President and Chief Technical Officer, ARCADIS

Doug Owen is an Executive Vice President with ARCADIS and is the Chief Technical Officer for the Water Division. A professional engineer in three states, he has led applied research projects on advanced technologies, consulted with utilities on water treatment and facility planning for over 6 billion gallons per day of treatment capacity throughout the United States, and has provided technical and facilitation support to USEPA and other policy makers on a range of policy issues since 1990. Mr. Owen currently serves as the Chair of the WaterReuse Research Foundation, as a Board member of the Water Environment Research Foundation and the Zofnass Sustainable Industry Advisory Board at Harvard, and has served on USEPA's National Drinking Water Advisory Council and as the Chair of the Editorial Board for *Journal AWWA*. He has published widely on water treatment and planning topics in books, peer-reviewed journals, and at national and international conferences.

Robert Page, PE, ENV SP

HNTB Corporation

Mr. Page is the storm water group lead in HNTB's Indianapolis office. He is a project manager with over 13 years of working with municipal clients on various projects including long term control plans, sanitary sewer projects, storm water design, waste water treatment plant design, and drinking water projects with extensive experience in various hydrologic and hydraulic modeling packages. Mr. Page is the design lead for an approximate \$30 million wet weather pump station in the City of Muncie, Indiana. In addition, he is currently the leader for the sustainability group of the American Society of Civil Engineers Metropolitan Indianapolis Branch.

Floren Poliseo, PE, ENV SP, Envision Verifier

New York City Department of Environmental Protection (DEP)

Bureau of Environmental Planning & Analysis
Director, Watershed Planning & Modeling

Floren Poliseo has 16 years of private and public engineering experience. At NYC Environmental Protection (DEP), she is Director of Watershed Planning & Modeling, and previously served as capital projects in-house design civil engineering Section Manager. She is an Envision Sustainability Professional and Verifier, and a founding member of DEP's Panel for Sustainable Infrastructure. In addition to engineering design, Mrs. Poliseo's past work in consulting included Sustainability Director at an engineering firm and sustainable design advisement for the Atlanta Beltline. As her master's capstone project, she developed impact metrics and communication strategies for decentralized sustainable infrastructure in peri-urban Mexico.

Spiro N. Pollalis

Director of Zofnass Program & Professor of Design, Technology & Management, Harvard GSD

Professor Pollalis is Professor of Design, Technology and Management at the Harvard Design School. Since 2008, he is the Director of the Zofnass Program for the Sustainability of Infrastructure that has led to the Envision Rating System. He is also the Principal Investigator of the project "Gulf Sustainable Urbanism" for 10 cities in the Arab Gulf, sponsored by the Qatar Foundation. He has taught as a visiting professor at the ETH-Zurich, Switzerland; TU-Delft, Holland; Uni-Stuttgart, Germany; U-Patras, Greece; and has offered joint courses with the Harvard Business School on planning and development. He serves as the co-chair of the Advisory Committee on Future Cities for the Singapore-ETH Center. Prof. Pollalis is the chief planner for the new DHA City Karachi for 600,000 people, currently under construction. He served as the Chairman and CEO of the public company for the redevelopment of Hellinikon, the former Athens airport, and he developed the base master plan and business plan (www.pollalis-hellinikon.com). Professor Pollalis received his first degree from the University in Athens (EMP) and his Master's and PhD from MIT. His MBA in high technology is from Northeastern University. He has an honorary Master's degree in Architecture from Harvard

SPEAKER BIOS

Judith I. Rodríguez Portieles, LEED AP, AIT

Research Associate, Zofnass Program for Sustainable Infrastructure, Harvard University Graduate School of Design

Judith I. Rodríguez Portieles, LEED AP, AIT, is a Harvard trained designer and researcher with expertise in sustainable infrastructure, architecture and landscape. Currently a Research Associate at Harvard University's Zofnass Program for Sustainable Infrastructure, she works in the IDB Infrastructure 360 Awards in Latin America and in US water infrastructure research through the Next Generation Infrastructure program supported by Surdna Foundation. Amongst her main interests is achieving infrastructure resilience through climate-minded design strategies. Her academic background is trans-disciplinary based in the fields of landscape architecture, architecture, environmental and urban design. Ms. Rodríguez is recipient of various awards including the Penny White Award and the Myron Goldsmith Memorial Fund award for best thesis. Her work has been exhibited and published internationally, and can be found in GSD Platform 5 and LCLA web. She has studied and worked in Tokyo under Toyo Ito, Pritzker Laurate 2013, and has held positions in prestigious design firms such as SOM in Chicago, Topotek 1 in Berlin and has collaborated autonomously with LCLA Office in Cambridge. Ms. Rodríguez holds dual master degrees from Harvard University Graduate School of Design (GSD) in Landscape Architecture and in Urban Design, and a Master in Architecture from the Illinois Institute of Technology (IIT). She speaks English, Spanish, Portuguese, German and French.

Richa Shukla Vuppuluri

Research Associate,

Harvard University Graduate School of Design

Richa is a Research Associate at the Harvard Graduate School of Design since 2010, where she has been involved in core research and management for *Gulf Sustainable Urbanism* project and the *Zofnass Program for Sustainable Infrastructure*. Her primary interests are in design research and next generation models for Urban Practice, International Development & Environmental Management. Richa was a recipient of Community Service Fellowship Award from Harvard GSD, and the Penny White Travel Fellowship to study greenhouse agriculture practice in Almeria, Spain. She has worked in architectural offices in Mumbai and held teaching position in KRV Institute for Architecture, Mumbai. She is an Envision Sustainability Professional & trainer (ENV SP) by Institute for Sustainable Infrastructure, member of American Water Works Association and Council of Architects in India. Richa holds Bachelor of Architecture from Mumbai University and Master of Architecture in Urban Design from Harvard University.

Newton W. Tedder

Environmental Scientist,

U.S. Environmental Protection Agency, Region 1

Newton Tedder is an environmental scientist at EPA Region 1. Newton holds a masters degree in Geology from Boston College specializing in surface water and groundwater contamination due to road salt application. Newton has over 10 years of experience in hydrology and hydrogeology in the public and private sector where he has worked developing public water supplies, tracking surface water pollution and, most recently, regulating surface water contamination due to stormwater. Newton has been at EPA Region 1 for 4 years and currently serves as the lead permit writer for the New Hampshire and Massachusetts Municipal Separate Storm Sewer (MS4) permits.

Art Umble, PhD, PE, BCEE

Wastewater Practice Leader, MWH Global

Dr. Umble provides technical analysis and support to design of new and rehabilitated wastewater treatment plants, focusing on nutrient removal, optimization for treatment capacity, operations optimization, wet weather treatment, solids treatment and disposal, disinfection, and advanced treatment. Dr. Umble consults on numerous state and national forums related to environmental regulation and legislation, treatment best practices and applied research in emerging technologies. His focus includes water quality standards, water and wastewater treatment technology, water reuse technology, energy management in treatment, biosolids treatment, and integrated watershed planning. He is active with the Water Environment Federation, serves on the Research Advisory Council for the Water Environment Research Foundation, and is advisor to applied research projects for both the Water Reuse Research Foundation and the Water Environment Research Foundation. In addition to consulting, Dr. Umble's experience includes 8 years in university teaching and a decade in managing public water and wastewater utilities.

John S Wise

Managing Principal, PE, CFM, ENV SP,
Stantec Consulting Services Inc.

John has over 37 years of hydrologic/hydraulic engineering experience. At Stantec, John is responsible for the preparation and management of Digital Federal Flood Insurance Studies, Map Revisions, flood control and drainage design, stormwater and drainage master plans, as well as environmental permitting with the ACOE and EPA. John was a 15-year member and Past President of the City of Tucson Stormwater Advisory Committee (SAC), which provided recommendations to Mayor and Council on matters relating to stormwater management. John participated with the City/County development of their Water Harvesting Guideline Manual for development and roadways. John has managed a beta test project for local governments using the AutoCASE economic evaluator model for stormwater and water harvesting best management practices. John was a member of the City of Tucson's Green Streets Policy team; developing the policy to implement Green Infrastructure/Low Impact Development/ Water Harvesting Guidelines for major roadways.

Elvio Zaghi, MBA, P.Eng.,

Principal, Stantec Consulting Ltd.

Elvio has 24 years of experience in the planning, design, and construction of municipal water and wastewater treatment facilities. He was the Project Manager for the Grand Bend Wastewater Treatment Facility, which recently earned the ISI Envision Platinum award. Grand Bend is the first Canadian project and first wastewater treatment plant in the world to receive an ISI Envision award. He was also the Project Manager for a complex retrofit of the Oxford Pollution Control Plant with MBR technology. It is the largest full-retrofit MBR project for cold weather application in North America, and was recognized with the Award of Excellence by the Association of Canadian Engineering Companies Canada. A graduate of University of Toronto and McMaster University, Elvio holds a Bachelor's Degree in Civil Engineering and MBA in Innovation and New Technology.

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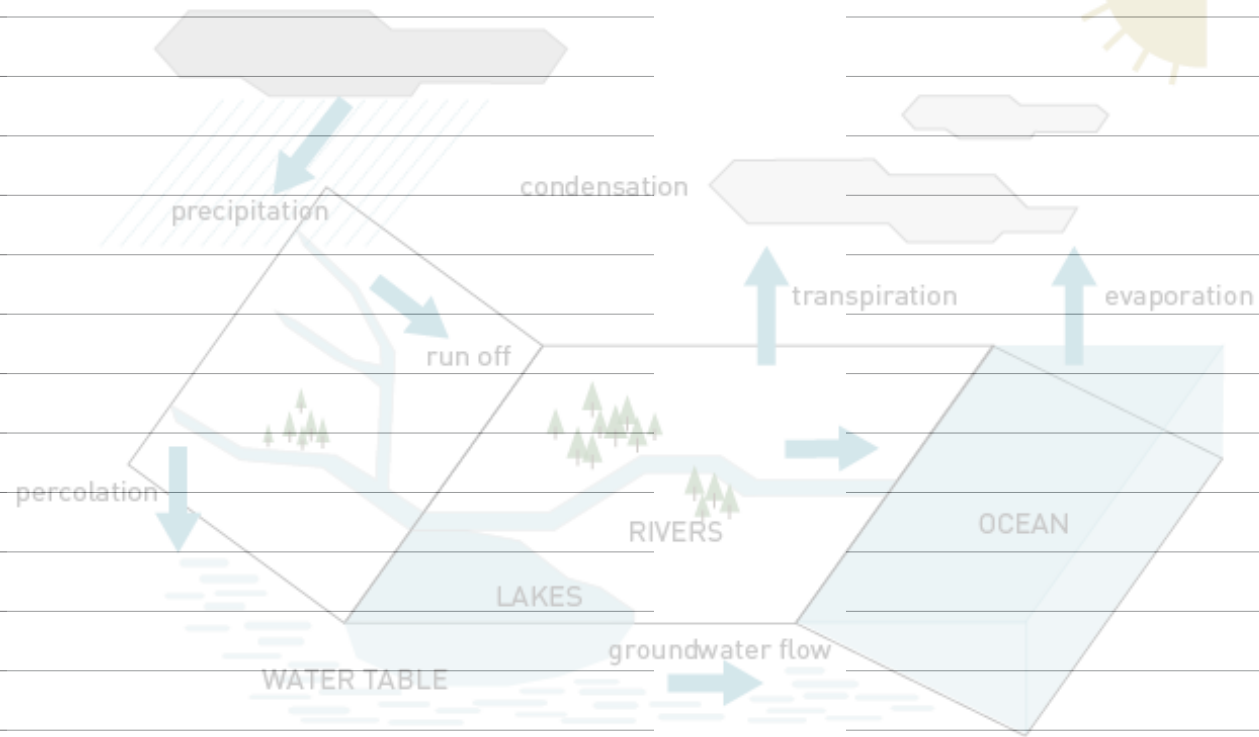
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Water cycle protection



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energy



transportation



solid waste



water



landscape



transportation



information



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