Session Overview
PNCWA Summit Series 1 & 2

Session 1: "Lure With Lizard Brain Lingo: How To Get What You Want Through Mindfully Crafted Messages"
Wednesday, September 30th, 2020
9:00am – 9:30am
Presenting Author: DeBaker, Karen debakerk@cleanwaterservices.org

Topics: Water Communication Strategies and Techniques
Keywords: communication, outreach, marketing, media, content

Abstract

As water scientists, we're flooded with data exposing how everyday human actions such as flushing wipes or rinsing paint brushes over storm drains impact our conveyance systems and waterways. We head straight to traditional outreach materials of billing inserts and brochures and scold customers. We plunk in a variety of confusing charts from our water quality tests. We then provide a long list of alternative actions through a one-size-fits-all lens. Now that they have all of the facts in front of them, why don't people do the "right" thing?Scientists believe that our decisions and behaviors are steered by our lizard brain rather than our rational brain. The lizard brain is quick, always on and requires 90% of our brain's energy in its default, survival mode. While our rational brain controls language, it is slow, lazy and only uses 10% of our brain's energy. We're under the illusion that we can go straight to the rational brain to change behavior. Our messages are text-centric, cognitive, heavy, and they fail to engage the true human behavior pilot–the lizard brain.In this session you'll learn how to speak to and stimulate the lizard brain to move people to desired action or understanding. You'll learn Brain 101, its basic functions and how it responds to our crowded and fragmented communication landscape. You'll walk away with the key stimuli and tried-and-true messages from the field to help you engage ANY human from ratepayer to elected official to your own Uncle Jerry.

Brief Biography and/or Qualifications

Clean Water Services
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Karen DeBaker is Communications & Marketing Manager for Clean Water Services —the water resources management utility serving more than 600,000 residents of urban Washington County, Oregon in the Portland-metro area. Karen recently celebrated 20 years of navigating the District's marketing, branding, communications, research and public education programs. Karen chairs PNCWA's Leadership Development Committee and is past Chair of the Communication & Outreach Committee. Prior to CWS she was a publicist for book publishing

companies in Portland, Oregon, and Minneapolis, Minnesota. Karen has Bachelor of Arts degrees in both Speech-Communications and Spanish from the University of Minnesota and Certificates in Business Management and Marketing from Portland State University School of Business.

Session 2: "River Reborn: 50 Years, 20 Minutes"
Wednesday, September 30th, 2020
9:30am – 10:00am
Presenting Author: Gonzalez, John gonzalezj@neorsd.org

Topics: Water Communication Strategies and Techniques
Keywords: history, sewers, messaging, communications, social media

Abstract

The 1969 Cuyahoga River fire wasn't the only one in its history. But it became the last, thanks to an alignment of local and national realities that changed the future of not only Cleveland but the environmental movement across the country.The river's rebirth took 50 years and it isn't finished yet. We'll look closely at the river that unites Cleveland more than divides it, and how a sewer utility used the story to celebratepeople, policies, and projects that brought a once-dead river back to life.Presented by Communications Manager of the Northeast Ohio Regional Sewer District John Gonzalez, the River Reborn story looks back on the crooked river's past, how the utility developed the campaign, and how they wove the story into materials and messages all year long.

•History –How the Cuyahoga River went from neglected to protected

•Its story –Crafting the 2019 River Reborn campaign

•Our story –Connecting with our community with creativity and authenticity

Brief Biography and/or Qualifications

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John Gonzalez is the Communications Manager for the Northeast Ohio Regional Sewer District in Cleveland. He manages internal communication and the District's social media platforms to share updates, answer questions, and promote often-overlooked aspects of clean-water work.

Session 3: Re-envisioning Strategic Planning for Community-Based Water Management – Innovative Stakeholder Solutions
Wednesday, September 30th, 2020
10:15am – 10:45am
Presenting Author: **Watson, Amanda. Hickman, Colin**

Abstract

Residents of our communities have a growing expectation to not only be kept informed of projects planned and underway, they want a seat at the table to create those plans. The City of Boise's Water Renewal Services (WRS) was determined to evolve the public involvement model in order to build a plan from the ground up—with the community steering. This robust stakeholder engagement process was the backbone of the City of Boise Water Renewal Utility Plan.

Brief Biography and/or Qualifications

Colin is the Community Engagement Manager for the City of Boise Department of Public Works. In this role, he is responsible for overall department communications, messaging and marketing. He manages the overall content strategy, creative process and public relations for major citywide initiatives. Colin serves as primary media contact and public information officer for the department. He has a bachelor's degree in history and a Master's degree in sustainable development.

Amanda Watson is the Owner & Founder of Atlas Strategic Communications, based in Boise, ID. She has nearly a decade of experience in strategic communications and public engagement, nearly all of which has been on the agency side as a consultant. Amanda's work has been recognized with more than a dozen awards, including honors from the Idaho Press Club, Idaho Advertising Federation and Capital City Communicators. Amanda received her bachelor's degree in Public Relations from the University of Idaho and is professionally certified in facilitation. She was also acknowledged as one of the Idaho Business Review's Accomplished Under Forty in 2013 and Women of the Year in 2016. She is a lover local food and wine, live music, and is in the never-ending search for the best street taco.

Session 4: "What If? Building An Effective Storytelling Team"
Wednesday, September 30th, 2020
10:45am – 11:15am
Presenting Author: **Wukasch, Greg** **Greg.Wukasch@saws.org**

Topics: Water Communication Strategies and Techniques
Keywords: Storytelling, Communication, Education, Outreach, Transformation

Abstract

What if...every person in your community believed that water was **the** most important resource and that your organization was **the** most important organization within your community? Sound impossible? By bringing together a group of capable ambassadors, providing them with a compelling story and adding a vision for work that truly matters-it is

possible. Join our discussion on the importance of assembling an effective storytelling team who connects to, communicates with and ultimately helps transform the community.

Brief Biography and/or Qualifications

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Since 1998, Greg Wukasch has worked in the External Affairs Department with the San Antonio Water System, beginning as an Education Coordinator and now as the External Affairs Manager. Greg really considers himself more of a "story teller" putting together water stories for citizens across the city he loves. When not talking H2O, this self-professed water nerd also geeks out on strategic planning and organizational culture discussion and loves hanging out with his wife of 26 years, his 3 children and his 2 grandchildren.

In addition to working with SAWS, Greg has also worked as an Environmental Educator with Aquarena Center in San Marcos, Texas as a Corporate Training Development Coordinator for the Six Flags Company and as an adjunct professor at St. Phillips College in San Antonio for 14 years.
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Session 5: "*Operator Insights on Maintaining and Recovering Biological Phosphorus Removal*"
Wednesday, October 28th, 2020
8:45am – 9:15am
Presenting Author: Brent Deyo, deyo0528@vandals.uidaho.edu

Abstract

Engineers and academics have many things to teach about theoretical and idealized approaches for achieving and sustaining successful BPR. However, it is operators who know the realities of creating requisite environments wherein BPR can best succeed, and who have critical insight on causes of, and recovery from, process failure. In order to gain valuable insight from operational leadership on their strategies for maintaining stable BPR, a survey was sent out to over 40 water resource recovery facilities (WRRF) practicing BPR. Reponses were analyzed to find overlapping themes, consistencies, and contradictions. Follow up interviews were conducted over the phone and through email to further examine and understand key comments within the responses. Analysis of results indicate that while every BPR facility is unique, there is substantial overlap between facilities that succeed and those that fail. This presentation will share and discuss insights, feedback, and operational strategies for sustaining and recovering BPR. While these approaches may not be suitable to every facility, the results of this

survey highlight the issues operators most need solutions to, and those they have already solved.

Brief Biography and/or Qualifications

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Brent Deyo is currently pursuing his MSc in Civil Engineering at the University of Idaho while working part-time as a consulting engineer. He received his BSc in Environmental Engineering from Oregon State University in 2014 and has worked within the consulting engineering industry since graduation**.**

Session 6: "*Data-Driven, Long-Range Forecasting of Biological Phosphorus Removal (BPR) Stability*"
Wednesday, October 28th, 2020
9:15am – 9:45am
Presenting Author: *Dr. Keaton Lesnik,* keaton@maiaanalytica.com

Abstract

Biological phosphorus removal (BPR) is a critical process for Clean Water Services (CWS) to cost effectively meet a stringent 0.1 mg/L effluent total phosphorus limit. At the Durham Facility, BPR has historically been observed to operate stably over long periods, only to become upset during critical times of year. The ability to forecast likely BPR upsets weeks in advance would help operators proactively respond to instability decreasing reliance on chemical use and improving phosphorus recovery.

Recently, CWS assessed a wide variety of characterization methods to quantify BPR health and provide early warnings of BPR instability. Several strong correlations were found between data generated from those tools and BPR upsets. However, a challenge exists in efficiently incorporating these data into normal operational process decision making.

This paper will present the development of machine learning models as a way to take in a large volume of relevant process information to generate real-time long-range BPR stability forecasts.

The questions addressed are:

1. Can machine learning models complement existing measurements of BPR health to improve the forecasted risk of BPR upset?

2. Which of the BPR health measurements provides the highest impact on the accuracy of the forecasted risk of BPR upset?
3. Does the incorporation of bi-monthly metagenomic sequencing data improve the forecasted risk of BPR upset?

Current efforts show that the machine-learning models can accurately forecast BPR stability over a 15-day period using 21 days of historical data. Based on this success, the machine learning models are being implemented in real-time so their performance and operational utility can be assessed. This presentation will include a summary of the online implementation for operational support and the observed accuracy of the forecast. The systematic evaluation of the benefit of different BPR health characterization methods and metagenomic data will also be presented.

Brief Biography and/or Qualifications

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Dr. Keaton Lesnik is the CEO of Maia Analytica, a National Science Foundation funded company developing real-time analytic software applications and game-based training tools for improved operational decision-making. Keaton received his PhD at Oregon State University where his research was focused on using data-driven approaches to incorporate microbial community sequencing data into biological wastewater treatment models. Current work is focused on improving the stability of biological phosphorus removal in collaboration with Clean Water Services, Oregon State University, and the Boz Institute.

Session 7: "*The Day I took Control of My Struvite Problem, or the Benefits of a Whole Plant Nutrient Balance*"
Wednesday, October 28th, 2020
9:45am – 10:15am
Presenting Author: Klein, Adam aklein@brwncald.com

Topics: Wastewater Treatment Process
Keywords: Phosphorus, struvite, resource, nutrient, mass balance

Abstract

Introduction/Problem Statement

The current bloom of phosphorus management approaches has been driven by two major factors. First, increasingly stringent phosphorus regulations have driven utilities to

investigate ways to reduce effluent total phosphorus (TP) concentrations. Second, sophisticated asset management tools have highlighted the ongoing cost of struvite-related maintenance, causing utilities to seek solutions to mitigate struvite accumulation.

Utilities now have an extensive selection of options to manage phosphorus. These include physical, chemical, and biological processes targeted towards the liquid treatment train, biosolids processing train, and dewatering return stream. The diversity of alternatives calls for an assessment method which is honest, simple, and straightforward.

Approach

The tool is a spreadsheet-based mass balance, which tracks nutrients through the treatment plant. Although the tool was calibrated using extensive characterization data, it can be applied to almost any utility, and loaded with data typically collected as part of the routine daily monitoring record.

Calculation Outputs

The presentation will include figures and tables depicting the nutrient mass balance across three test facilities. Balances will be presented for total phosphorus, soluble ortho-phosphate, ammonia, and TKN.

Concluding Statements

The tool presented in this paper uses a simple mass balance to project risk, and compare mitigation alternatives. In addition to evaluating add-on struvite precipitation processes, it has been used to compare impacts of chemical precipitation approaches at primary and secondary clarifiers to biological phosphorus removal, and has also been used to assess the impacts of food waste acceptance and co-digestion on nutrient loadings and struvite potential.

Brief Biography and/or Qualifications

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Adam Klein is a wastewater process engineer, specializing in the planning, design, and process optimization of wastewater treatment plants. He has over 15 years of experience with Brown and Caldwell.

Session 8: "*Integrated Planning at the Intersection of Nutrients, Toxics, Unregulated Compounds, and Climate Change*"
Wednesday, October 28th, 2020
10:30am – 11:00am
Presenting Author: Dave Clark, Haley Falconer

Abstract

Wastewater utilities face a combination of challenges to effective planning that transcend silos in regulatory frameworks, span multiple constituents, and emanate from a changing planet. Planning must embrace this dynamic combination to be effective in guiding decisions, prioritizing investments, and adequately preparing utilities for the future. Ignoring the multiplicity of challenges in pursuit of absolute certainty about a single factor (CSO/SSO or nutrients or toxics) may sacrifice the opportunity to capture the synergy from collateral benefits that satisfy a combinations of requirements despite uncertainties. Now that Integrated Planning has been codified in the Clean Water Act in 2019, managers have a new tool to leverage permit negotiations and competing compliance requirements with realistic schedules that consider local priorities and affordability. This suggests that an improved planning approach will define incremental implementation steps in an adaptive management framework because it provides better information to guide subsequent decision making over time, balances customer cost impacts, and improves future outcomes.

Since many, if not all aspects wastewater systems are interrelated, grouping recommended studies and capital improvements into programs with common goals that align individual projects, may better address uncertainty and competition for limited resources. Coordination in programs allows for evaluations of technology studies, pilot testing, receiving water monitoring/modeling, and implemented projects for better information to reduce uncertainty and optimize operations and capital improvements over time. Recognition that climate change is altering fundamentals in wastewater characteristics and receiving water quality necessitates the need to tune actions and expectations over time. Opportunities created by phased implementation may address multiple challenges, aid in risk management, and reduce overall costs. An Integrated Plan that articulates this approach to implementation provides the additional benefit of informing permitting and regulatory compliance. Cost savings resulting from this approach flow entirely to the benefit of the local utility and its customers.

Brief Biography and/or Qualifications

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David L. Clark is Senior Vice President and serves as HDR Engineering, Inc.'s Market Sector Director for Wastewater. He has more than 40 years of consulting experience

and currently leads strategic efforts in understanding wastewater regulatory issues as they affect wastewater utilities. Mr. Clark is the regulatory liaison for the Water Research Foundation (WRF) nutrient research program and the lead author on regulatory issues. He recently published a report on Nutrient Discharge Permitting Frameworks for WRF addressing wastewater utility issues with surface water discharges. Mr. Clark was recently named a Fellow of the Water Environment Federation (WEF).

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Haley Falconer is Environmental Division Manager at the City of Boise. In this role Ms. Falconer provides direction for environmental and sustainability initiatives across the City. The Environmental Division serves as a resource for City operations, helping to advance in the areas of energy efficiency and energy production, smart building design, water management and reduction, and materials management.

Session 9: "*Technologies for Nutrient Removal in Small or Decentralized Wastewater Treatment Plants*"
Wednesday, October 28th, 2020
11:00am – 11:30am
Presenting Author: *Dr. Raj Chavan,* raj.chavan@stantec.com

Topics: Wastewater 101, Wastewater Treatment Process
Keywords: Small Communities, Decentralized Plant, Nutrient Removal

Abstract

According to EPA report nutrient pollution is one of America's most widespread, costly and challenging environmental problems impacting water quality. Discharge of this nutrients in excess to our waters lead to a variety of problems including eutrophication, with impacts to drinking water, recreation and aquatic life. Therefore, more stringent effluent nutrient limits have been imposed on most of wastewater treatment plants (WWTP) and are coming to others. WWTPs have added or adding intensive treatment processes for extensive nutrient removal, but these upgrades are not affordable specially for smaller treatment facilities. WWTP have significant economic and environmental benefits associated with their construction and operation; however, like other similar infrastructure, the economic and environmental impacts of their construction and operation need to be minimized to make affordable to the smaller facilities. Worldwide, it has been acknowledged that small-scale WWTPs can be resource intensive when compared with larger plants. WWTPs have reduced their

nutrient discharges by optimizing operation and maintenance practices without incurring large capital expenses. This paper presents economical ways the existing small utilities can retrofit/upgrade, optimize, and/or operate their facilities to meet nutrient effluent limits. Along with available technologies some case studies will be presented.

Brief Biography and/or Qualifications

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Raj is Regional Wastewater Practice Lead (Pacific US) with Stantec, Las Vegas, NV office. His main areas of expertise include design and planning of wastewater treatment plant (especially nutrient removal). Raj has also been involved in several bench-, pilot-, and full-scale studies including functionality testing on the various water and wastewater treatment process trends. In addition, he has been involved in several research projects including innovative technologies, sidestream treatment for nutrient removal, DBP formation and precursors, etc.

Session 10: "*Sidestream and Mainstream Deammonification for Innovative Nitrogen Removal*"
Wednesday, October 28th, 2020
11:30am – 12:00pm
Presenting Author: Dr. Li Lei, li.lei@jacobs.com

Abstract

Removing nitrogen through partial nitritation followed by anammox, deammonification has been the most significant breakthrough in wastewater treatment in decades. Compared with conventional nitrification/denitrification, deammonification allows approximately 60% aeration saving and eliminates the need for organic carbon. Sidestream deammonification treats high strength dewatering centrate and has been successfully implemented in over 100 full-scale applications worldwide. Incorporating deammonification into the mainstream process is well recognized as promising for substantial energy and chemical savings and viable for achieving energy neutrality. This presentation will review in detail two full-scale facilities that have implemented both sidestream and mainstream deammonification, the 60 mgd Ejby Mølle Wastewater Treatment Plant (WWTP) in Odense, Denmark, and 54 mgd AlexRenew Water Resources Recovery Facility (WRRF) in Alexandria, USA.

Both facilities embarked on an energy optimization program to promote nitrogen removal through the anammox pathway and reduce aeration requirements through implementation of DEMON™ sidestream deammonification and induction of mainstream

deammonification, by operating the bioreactors in transient aerobic/anoxic conditions that yield low DO concentrations through ammonia-based aeration control (ABAC), bioaugmenting with ammonia oxidizing bacteria (AOB) and anammox granules from the sidestream deammonification reactors, and retaining the granules by waste activated sludge (WAS) hydrocyclones.

At Ejby Mølle WWTP, the hydrocyclones coupled with sidestream anammox granule seeding successfully retained large organic granules, with the highest anammox population concentrated in larger granules ranging from 250 µm to 500 µm in diameter, resulting in a significant decrease in SVI by approximately 40 percent. The plant now operates at approximately 115 percent energy self-sufficiency in terms of electricity. The upgrades at AlexRenew WRRF have reduced the methanol consumption by 50% and aeration by 30%, while better meeting the more stringent 3 mg/L effluent TN.

Nitrite oxidizing bacteria (NOBs) were also retained in the hydrocyclone underflow, indicating that opportunity exists to further improve deammonification by out-selecting NOBs.

Brief Biography and/or Qualifications

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Dr. Lei is a senior technologist with Jacobs' Seattle, Washington, office, specializing in wastewater treatment. Her work includes capacity assessment, upgrade planning, startup assistance, as well as operation optimization and troubleshooting of various wastewater treatment processes. She has extensive experience in design and study of nitrogen and phosphorus removal processes using conventional activated sludge process or newer technologies such as MBR, IFAS and MBBR. She has also evaluated innovative side stream treatment processes and solids reduction technologies for their potentials to help meet the overall treatment needs.