HEALTHY WATERWAYS 2.0

Schedule & Abstracts

Tuesday August 1, 2023
CSIRO/NMI
Bradfield Road, Lindfield
Sydney

Version 4

Message from the RACI AEG organising committee

Dear Invited speakers and attendees,

Thank you for participating in our one-day symposium - “Healthy Waterways 2.0”. After the success of our initial conference in 2019 at the Sydney Water building in Parramatta, this sequel in the series has been designed to spotlight cutting-edge research and provoke spirited discussion among interested professionals at the front lines of managing water resources. The audience is expected to consist of RACI members, laboratory analysts, regulators, academics and water industry representatives.

The theme for this symposium is sustainable management of water resources. There are pressures on the environment and particularly on water resources because of population and economic growth, climate change, drought and pollution. We need a sustainable source of water for our livelihood, environment and economy. Our oceans, rivers, streams and lakes are critical to the eco-system to support the habitats for native wildlife, fish, birds and plants. It is also important to agriculture, domestic use and industry.

The challenge is to change the way we think about water, manage our water and recognise its value. Let’s protect this precious resource for a sustainable future.

RACI AEG organising committee

- Danny Slee (NMI)
- Kris Mobberley (Sydney Water)
- Luminita Antin (NMI)
- Victor Wong (UNSW)
- Alena Kochubei (Macquarie University)
- Danny Wong (Macquarie University)
- Alice Lee (UNSW)
- Paul Pui (SGS)
- Susil de Zoysa
- Nathan Camilleri (SGS)
- Alex Donald (UNSW)
- Tanjina Noumi (Qenos)
- Mark Lewin (NMI)
- Svyat Eliseenko (Waters)
- Michael Kowalczyk-Barker (NMI)
- Se Gong (CSIRO)

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Botany Industrial Park

General Information

Website: [Healthy Waterways 2.0]

When: 9 am to 3:00 pm on Tuesday August 1, 2023

Where: CSIRO/NMI building, 36 Bradfield Road, Lindfield Sydney

Symposium: The NSW Analytical and Environmental Chemistry Group of The Royal Australian Chemical Institute (RACI) is organising the 2023 One-day Symposium "Healthy Waterways 2.0".

The venue:

- The event is held at the CSIRO/NMI building, Lindfield. See map in Figure 1 below. The venue is theatre style.

On the day:

- The registration desk is located outside of Lehaney theatre.
- The registration/help desk will be open from 8:30 am.
- A name tag will be provided for all attendees.

Speakers:

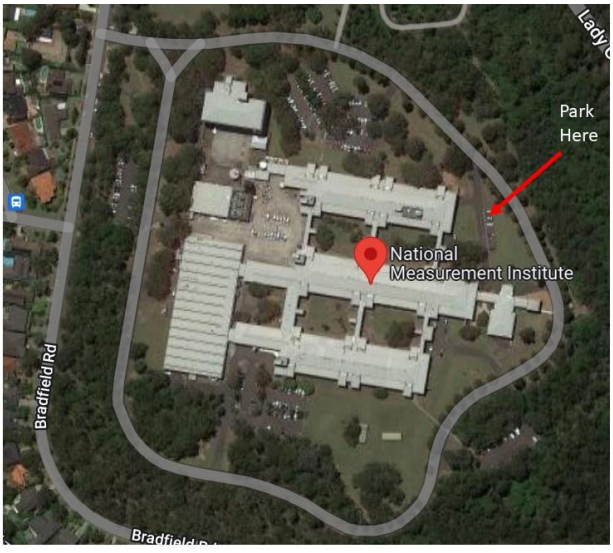
- Report to the registration desk at least 30 minutes before your presentation.
- RACI is using a Windows 10 based laptop to display each presentation. The preferred presentation format is Microsoft powerpoint. Please convert to powerpoint format if you are using an alternative format.

  Email– *danny.slee@measurement.gov.au* *or phone* Danny Slee Mob 0423023402 if you have any further queries. Thanks for participating in Healthy Waterways 2.0.

Yours sincerelyRACI NSW Analytical & Environmental Chemistry Group

NMI/CSIRO
Lindfield

36 Bradfield Rd
Lindfield 2070



Healthy Waterways 2.0 - Schedule

8:30 am to 9:00 am	Registration – Foyer of Auditorium	
Session 1 – Auditorium (Chair: Danny Slee, NMI)		
9:00 am to 9:10 am	Opening - Welcome to CSIRO/NMI	Danny Slee, NMI
9:10 am to 9:35 am	Healthy Waterways: A living System	Justine Djajadikarta & Annalisa Humphrys, Sydney Water
9:35 am to 10:00 am	Metal contaminants in aquatic systems	Dr Graeme Batley, CSIRO
10:00 am to 10:25 am	Algal Taste and Odour Production in Water Reservoirs: Beyond Geosmin and 2-Methylisoborneol	Johnson Wong, Uni NSW
10:25 am to 10:30 am	Sponsor – Hanna Instruments	
10:30 am to 11:00 am	Morning Tea – Foyer of Auditorium	
Session 2 – Auditorium (Chair: Paul Pui, SGS)		
11:00 am to 11:05 am	Sponsor - Merck	
11:05 am to 11:25 am	The Seabin Project	Tom Batrouney, Seabin Pty Ltd
11:25 am to 11:40 am	Rethinking Plastic waste: West Ryde labs and Plasmar	Xanthe Petridis, Sydney Water & Rose Smithers, Plasmar
11:40 am to 11:45 am	Sponsor – Choice Analytical	
11:45 am to 12:05 pm	Microplastics are everywhere – but how do we analyse them?	Julia Jaeger, Eurofins
12:05 pm to 12:25 pm	The challenges of managing trade waste from a diversified chemical manufacturing complex - herding metaphorical cats	Dr Richard Benson
12:25 pm to 12:30 pm	Sponsor – Dr Chen Lim	
12:30 pm to 1:30 pm	Lunch – Foyer of Auditorium	
Session 3 – Auditorium (Chair: Kris Mobberley, Sydney Water)		
1:30 pm to 1:35 pm	Sponsor – Waters	
1:35 pm to 2:00 pm	The role of sensors in catchment and lake water quality monitoring at WaterNSW'	Lisa Hamilton, Water NSW
2:00 pm to 2:25 pm	River Watch - predicting recreational water quality	Nerida Taylor, Sydney Water
2:25 pm to 2:45 pm	Towards a Water-Sensitive Campus at Macquarie University	John Macris, Macquarie Uni
2:45 pm to 2:50 pm	Sponsor - Shimadzu	
2:50 pm to 3:00 pm	Close	Danny Slee, NMI

Abstracts

Healthy Waterways: A Living System

Presenting author
Annalisa Humphrys Aquatic Ecologist, Sydney Water
Justine Djajadikarta Aquatic Ecologist, Sydney Water
Robert Allen Program Scientist, Sydney Water

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Annalisa Humphrys, Justine Djajadikarta, Robert Allen

Bio

Annalisa: I have worked at Sydney Water for 5 years. I began working as a Sample Receipt Officer before joining the Aquatic Ecology team in 2018. Key areas of my work include the sampling and laboratory identification of freshwater macroinvertebrates. I am also involved in routine project reporting, and I have recently begun training in marine identifications as part of Sydney Water's Ocean Sediment Program.

Justine: I have been part of Sydney Water for 10 years, working as an Aquatic Ecologist.
A Marine Biologist by trade, I have a passion for heading Sydney Water's Ocean Sediment Program and enjoy working on the project annually identifying benthic samples in their thousands. Within the Aquatic Ecology group, I look after the quality management systems, help with the tracking of projects, and the training of new staff in all our methods.

Rob: I have worked at Sydney Water for 16 years, as an Environmental Scientist, with the last 13 years spent working in stormwater and natural asset management. Our team manages both civil stormwater assets (pipes and gross pollutant traps) and natural waterways (creek, riparian land and wetlands). I love the challenges of my role in helping to protect and enhance natural areas around Sydney.

Abstract

The Aquatic Ecology labs, located in West Ryde, play a major role in the biological monitoring of Sydney Water Assets, and their external stakeholders. Our work helps maintain regulations placed by the EPA, and to meet compliance standards. We specialize in the identification of Freshwater and Marine macroinvertebrates to Family, Genus, and species level and use them as biological indicators to determine the health of the ecosystem. We base our sampling methods on

AUSRIVAS sampling techniques, with current staff accredited in the practice.
Current methods performed by the Aquatic Ecology Lab include Macroinvertebrate sampling, Macrophyte identification, Riparian Studies, Biodiversity surveys, Estuarine Quadrats, and Water Quality testing. We are a NATA (National Association of Testing Authorities) accredited lab in Freshwater and Marine identification, and also have the only 2 Marine Specialists nationally accredited.

Metal contaminants in aquatic systems

Dr Graeme Batley, CSIRO

Metals are ubiquitous contaminants in waters and sediments, deriving from multiple sources including stormwater runoff, industrial discharges, shipping and especially mining and mineral processing. Management is improving but there remain legacy contaminants in sediments. The significance of these various sources will be discussed with examples from local studies and those of mining activities in PNG.

Algal Taste and Odour Production in Water Reservoirs: Beyond Geosmin and 2-Methylisoborneol

ChungYiin (Johnson) Wong
School of Civil and Environmental Engineering, Water Research Centre

Email: johnson.w@unsw.edu.au


Johnson Wong

Johnson is currently affiliated with the School of Civil and Environmental Engineering, University of New South Wales (Australia), pursuing his Doctor of Philosophy degree in water resources engineering. His primary research interests include microbial and algal bio-products, as well as green chemistry. As of now, he is investigating the biogenic taste and odour compounds produced by cyanobacteria and algae in source water.

Abstract

The two distinct odorants, geosmin and 2-methylisoborneol (2-MIB) are frequently found in the environment and have a big impact on our sense of smell. It is produced by certain types of cyanobacteria, commonly known as blue-green algae. Humans are able to smell geosmin in tiny amounts as low as 10 parts per trillion due to its low odour threshold concentration. Although both geosmin and 2-MIB are generally harmless, their presence in drinking water can impact sensory perception and consumer acceptability. Other biogenic taste and odour chemicals include numerous forms of volatile organic compounds (VOCs) generated by algae, bacteria, and fungi. These

chemicals can impart a wide range of tastes and odours to water, for instance, beta-cyclocitral, 2,4,6-trichloroanisole, and dimethyl sulphide (DMS). It is critical to monitor water sources for the presence of biogenic taste and odour chemicals on a regular basis in order to identify and treat potential problems as soon as possible. By understanding the sources and characteristics of these compounds, the water treatment sector can implement effective strategies to ensure that drinking water meets acceptable taste and odour standards, improving consumer satisfaction and overall water quality.

The Seabin Project

Tom Batrouney
Seabin, Brand Experience

Email: tom@seabinproject.com

Tom Batrouney
Brand Experience - Seabin

Tom Batrouney is the Head of Brand Experience at marine pollution monitoring, cleanup and nature repair group Seabin. Seabin are on a mission to fill knowledge gaps using data and education around what items are polluting our waterways and how we can implement policies to minimise pollution and repair the planet.

Abstract

Seabin will be unveiling and presenting our 2022 Impact Report for Microplastics, marine litter and plastic pollution in Sydney Harbour.

Microplastics are everywhere – but how do we analyse them?

Julia Jaeger
Eurofins Environment Testing Australia, 6 Monterey Road, Dandenong South, VIC 3175, Australia
JuliaJaeger@Eurofins.com

Julia Jaeger

Julia Jaeger is a Technical Specialist at Eurofins Environment Testing Australia & New Zealand. She holds a Master's degree in Food Chemistry and a PhD in Physical Chemistry. Over the past +10 years, she has gained extensive experience in Analytical Chemistry, working in various sectors such as environmental and atmospheric chemistry, food, and forensics. In 2019, she established a laboratory for commercial microplastic testing, utilizing the Laser Direct Infrared (LDIR) Chemical Imaging System. Julia also specializes in the analysis of organic contaminants, particularly VOCs and pesticides.

Abstract

Plastic is an incredibly versatile material, and it is hard to imagine a world without it. Since 1950, over 9 billion metric tons of plastic have been produced, and production continues to increase exponentially. Unfortunately, disposal and recycling haven't kept pace with demand, resulting in a significant proportion of plastic waste ending up in the environment and contaminating our land, air, and oceans as microplastics. Toxicological studies have shown that microplastics can cause various adverse health effects.

While microplastics were first detected in the environment in 1972, it is only in the last 20 years that testing methodologies have been significantly advanced, mainly by research facilities and universities. Substantial efforts are currently being made worldwide to standardize methodologies for sampling and analysis, as well as the availability of suitable reference materials in the correct size ranges.

Three years ago, we established the first commercial laboratory for microplastic testing in Australia, using the novel Laser Direct Infrared (LDIR) Chemical Imaging System. We have combined these methodologies with our learnings from operating an ISO17025 accredited environmental laboratory. With our current setup, we can provide a determination of the particle enumeration, size, morphology, colour, and identification of microplastics in a variety of different matrices, including clean and dirty waters, soils, biosolids, sand, sediment, and biota for routine commercial samples. We have also implemented stringent quality control and blank measures to reduce the uncertainty of the results, and we aim to gain accreditation within the next year. To benchmark our laboratory, we participated in an international proficiency study by Southern California Coastal Water Research Project (SCCWRP) among 21 other laboratories from 6 countries. These results have been published in a peer-reviewed journal. Additionally, in collaboration with the University of Melbourne, we analysed bottled water and groundwater samples in our laboratory and published these results.

The challenges of managing trade waste from a diversified chemical manufacturing complex - herding metaphorical cats.

Dr Richard Benson
Botany Industrial Park

Email: correspondingauthor@address

The Botany Industrial Park (BIP) has seen manufacturing operations within it's boundaries for over 80 years. The current iteration sees four companies operating 9 plants which discharge to trade waste. Managing trade waste discharge on a site that evolved in the 1940's is not without its challenges, add the complexity from the diverse nature of production processes and the different owners and you have a "system" that requires the implementation of careful controls, close cooperation between all parties and a lot of hard work. I will open the black box that is managing effluent from the BIP and reveal a few secrets that lie within.

The role of sensors in catchment and lake water quality monitoring at WaterNSW

Lisa Hamilton
Operating Strategy, WaterNSW

Email: lisa.hamilton@waternsw.com.au

Lisa Hamilton

Dr Lisa Hamilton manages the team that delivers WaterNSW scientific research program into catchment health for the protection of water quality. She has a breadth of applied research experience across the water industry including water quality in catchments, wastewater treatment and potable distribution systems. She has a PhD applying ecotoxicological assessment to wastewater treatment removal efficacy of endocrine disrupting chemical. She is passionate about valuing our environmental assets and ensuring research delivers meaningful insights for business transformation.

Abstract

WaterNSW operates a complex network of monitoring across waterways in NSW for the management of raw water supply to our customers. Increasingly we are looking to remote sensing that provides real-time information to aid operational decision-making during events that effect water quality, such as floods, fire and algal blooms. Environmental monitoring provides significantly more challenges compared to monitoring other stages of water supply. In addition, very little commercial, reliable methods exist beyond 'the big five' physico-chemical parameters of temperature, conductivity, pH, turbidity, and dissolved oxygen. WaterNSW has recently undertaken trials of two commercially available sensors that are compatible with our 'big five' monitoring equipment to track organics and chlorophyll in two of our Greater Sydney Supply lakes. This presentation will outline the opportunity and the challenges that adopting this monitoring water supply management.

The opportunity of additional types of water quality sensors in our water monitoring include real-time information to better understand spatial and temporal dynamics, calibration and verification of water quality models, machine learning forecasting development and field safety implications. Some of the challenges include understanding interferents and site-specific calibration requirements, applying correction algorithms in a highly dynamic environmental matrix, impacts on light quenching at depth, developing QA/QC protocols and comparing to guidelines and trigger values that usually require benchmarking with NATA accredited results.

RiverWatch – predicting recreational water quality

Nerida Taylor
Sydney Water

Email: nerida.taylor@sydneywater.com.au

Nerida has worked for Sydney Water for the past four years on a multifaceted project to bring swimming back to the Parramatta River. This project is a coordinated approach to improve catchment management; monitoring water quality, including reviewing land-use planning controls, working with partners to improve stormwater management and working internally to upgrade sewer infrastructure.

Nerida Taylor

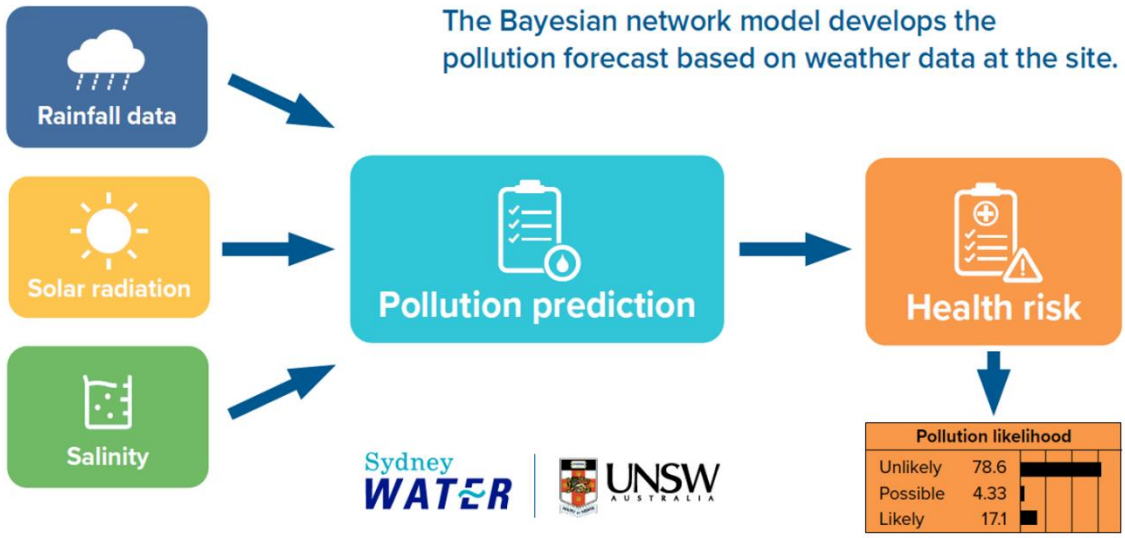
Abstract

Sydney Water has been working with the Parramatta River Catchment Group (PRCG) to support their mission to open three new swimming locations on the river by 2025 (PRCG, 2018). In 2019, Sydney water established a water quality monitoring program (RiverWatch) to support the establishment of these new swim sites.

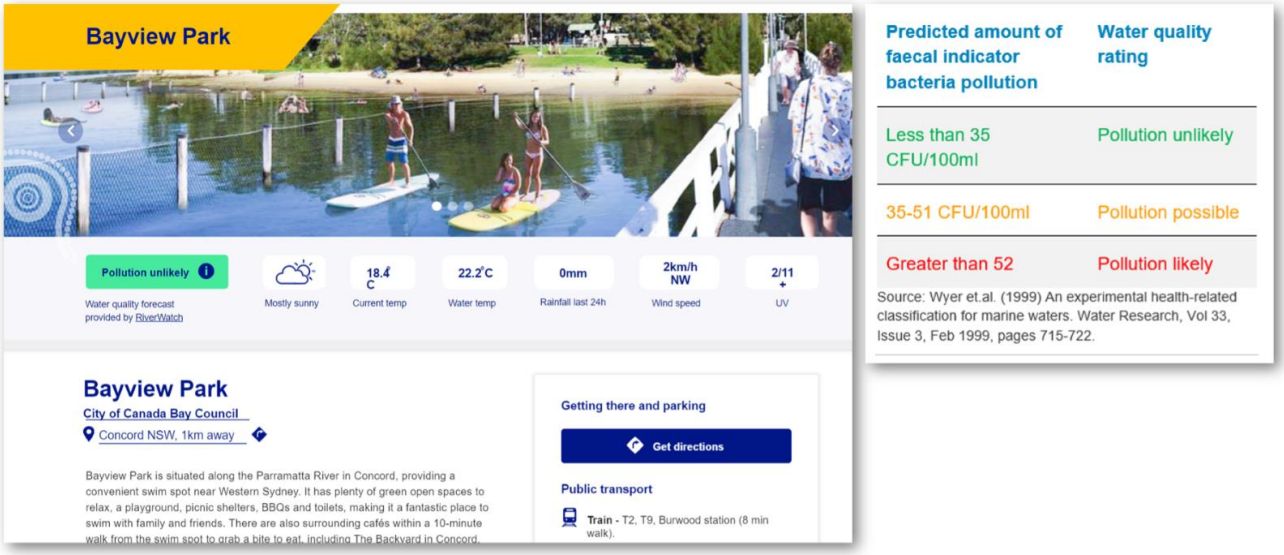
Engagement work carried out by the PRCG identified a key barrier to swimming was concerns around pollution and water quality. Publishing water quality results was identified by 66% of respondents as a key action to increase the likelihood of swimmers using the river (Little Triggers, 2016).

A barrier to reporting on a site's suitability for swimming is the time lag between testing the water and receiving microbial water quality results from the laboratory. The National Health and Medical Research Council (NHMRC) Guidelines for Recreational Water Quality (2008) endorses the use of predictive modelling to address this issue.

Sydney Water has partnered with the University of NSW, to develop site-specific models that consider antecedent rainfall and other environmental factors to predict microbial pollution load at urban swim sites. This information is then converted to an index that can be communicated to the public.



The UNSW model has been transformed from a research prototype to an automated and deployed product within Sydney Water. It uses data feeds from BOM and Sydney Water rain gauges. The model for the first RiverWatch monitored swim site at Bayview Park Concord went live when the swim site was officially opened on 11/11/2022.The model currently runs daily, and the prediction is displayed on Sydney Water's dedicated Urban Plunge website www.urbanplunge.com.au



At Sydney Water, clean waterways are fundamental to our vision of creating a better life with world class water services. We want all of Sydney to have the opportunity to cool down, go for a swim and enjoy nature. The adoption of this new predictive monitoring approach can support this and broaden Sydney's cultural identity as a global lifestyle city.

Towards a Water-Sensitive Campus at Macquarie University.

John Macris
Biodiversity Planner, Macquarie University

Email: john.macris@mq.edu.au

John Macris

I have worked in the Sustainability realm at Macquarie University's Property (Facilities & Projects) Office since 2009.

I'm also a graduate of Macquarie's Environmental Science programs, with an emphasis on geomorphology, environmental management and remediation.

Through this role, I have had a direct stake in several rehabilitation projects on the campus's urban creeks and natural bushland areas, and retrofits of storm water infrastructure.

Abstract

Macquarie University manages a large campus in Sydney's northern suburbs. At the time of founding, our site was on the urban-rural fringe of the city, while today it sits beside an area of intense economic activity in the Macquarie Park corridor.

Our site's development provides a set of case examples, across the decades, in how approaches to mitigating the effect of urbanization on receiving water courses has matured and innovated.

The presentation will cover our experiences with making a shift from exclusively hard-engineering, to adopting a range of soft engineering solutions, towards Water Sensitive Urban Design (WSUD) objectives.

The consideration of space and topography will also be reflected on, regarding selecting the most relevant approaches to improving the habitat quality and amenity of our site's urban creeks and large ornamental lake.