EDAR8
Environmental Dimensions of Antimicrobial Resistance
Brisbane, 2-7 August 2026

WORKSHOP OVERVIEW

Workshop Title	Integrating omics, ecological insights, and One Health perspectives into antimicrobial resistance (AMR) quantitative microbial risk assessment (QMRA) for Water Safety Management
Facilitators and contributors Details of the individuals leading and contributing to the workshop, including: • Workshop facilitators • Guest speakers or contributors • Their roles in the session	**Kerry A. Hamilton**, Arizona State University **Nicholas Ashbolt**, Queensland University of Technology **Amy Pruden**, Virginia Tech **Eddie Cytryn**, Volcani Institute, Israel **Anne Roiko**, Adelaide University **Susan Petterson**, Water & Health Pty Ltd. Additional Speakers: **Hunter Quon**, Arizona State University **Kseniia Erokhina**, Volcani Institute, Israel; The Hebrew University of Jerusalem
Background An overview of the context and rationale for the workshop, outlining the key issue, challenge, or opportunity it addresses, and why this topic is timely and relevant.	Environmental AMR research has advanced with high-throughput and omics tools for measurement and identification of resistance genes (RGs), transfer of mobile genetic elements (MGEs) of pathogenic bacteria, and complexity of resistance reservoirs. However, risk assessment frameworks such as QMRA largely rely on culture-based pathogens, overlooking environmental dynamics and potential vectors of AMR persistence. Additionally, applications to water safety planning have been limited due to uncertainties related to the presence, persistence, and fate of resistant pathogens ARGs, and residual antibiotics in environmental exposure pathways and exposed individuals. Recent advancements using enrichment-based methods and metagenomics are uncovering the "under-the-radar" reservoirs, and other potential hotspots of pathogens that can receive and host resistance, such as *Acinetobacter*, *Aeromonas*, *Pseudomonas*, *Stenotrophomonas* spp., etc. along with associated MGEs carrying RGs. These AMR determinants are known to thrive in wastewater reuse and agricultural systems, highlighting their potential for human exposure. This workshop will bridge these high-throughput and methodological insights with expert input and One Health-based quantitative microbial risk frameworks to better identify, quantify, and translate environmental resistance data and better inform fit-for-purpose water reuse schemes and recreational water safety.
Workshop Aims A description of the purpose of the workshop and its intended focus. This section highlights what participants can expect to explore, learn, or develop during the session.	This workshop aims to connect researchers, policymakers, and regulators generating high quality environmental AMR data with risk assessment and modelling. By bridging these communities, we invite open discussion, identify shared needs, and learn how to bridge the gap between complex data and actionable risk estimates and recommendations. Participants will explore the challenges from both perspectives, including gaps in the research to better identify and measure the overlooked areas of resistance. In addition, participants will learn how these data are used in modelling frameworks like Bayesian networks, dose-response, and QMRA, with demonstrations in coding software or data-driven group work. Through discussion, case studies, and group activity, the workshop will develop a shared understanding of how to produce more data for AMR risk assessment and dynamic modelling. Participants will: • Gain a better One Health understanding of the complexities related to the evolution of AMR and the challenges they present to QMRA • Consider the significance of different lines of evidence about AMR to QMRA • Explore how new variables and sources of uncertainty can be integrated into each step of QMRA • Discuss methods for integrating metagenomic outputs into risk assessment frameworks

	• Identify research priorities and opportunities for ongoing collaboration around improving QMRA guidance and training
Participant Takeaways A summary of what participants will gain from attending the workshop. This may include new knowledge, practical skills, tools, frameworks, or shared resources, as well as any tangible outputs (e.g. ideas, draft materials, or collaborative outcomes).	Participants will ultimately leave the workshop with a clearer understanding of the needs of AMR risk assessment modelling and how to connect microbial and molecular data with risk. They will acquire a shared understanding of how One Health frameworks can enhance Quantitative Microbial Risk Assessment (QMRA) in the context of Antimicrobial Resistance (AMR) in aquatic environments. Together, the participants and facilitators will develop outputs, including: 1. Strengthen their ability to interpret and incorporate One Health concepts into QMRA applications related to AMR. 2. Identification of knowledge and data gaps, and key uncertainties and methodological priorities for metagenomic approaches 3. Frameworks for translating molecular ARG and related data into quantitative parameters for population and risk models 4. Develop a census on priorities for future research and share resources and roadmaps for water treatment and reuse, agriculture and food safety, and environmental monitoring 5. Solution oriented recommendations for prioritizing data in these sectors in the future, including model validation. 6. By the end of the workshop, participants will be better equipped to apply One Health-informed approaches to enhance the scientific relevance, accuracy, and policy impact of QMRA for water safety management.
Expected Impact An outline of the broader value of the workshop, including how it may: • Influence research, policy, or practice • Support collaboration and knowledge exchange • Contribute to future work or ongoing initiatives	The workshop will chart a path forward for One Health thinking into QMRA leveraging the fields of bioinformatics, molecular biology, epidemiology, risk assessment, and environmental engineering towards quantification and prediction of environmental AMR risks. The workshop is expected to engage researchers, regulators, and professionals to produce forward-thinking frameworks and produce working groups of professionals to work on issues identified at the conference. By creating a roadmap for omics and other novel method integration into microbial risk assessments for the water sector, the workshop will support collaboration and identify research needs for the broader EDAR community, identify priority areas for harmonizing methods and data integration, and strengthen cross-sectoral networks.
Who should attend? Information on the intended audience for the workshop, including: • Relevant backgrounds, sectors, or expertise • The level of participation expected (e.g. discussion, group work, problem-solving)	This workshop is designed to engage participants with broad backgrounds in microbial ecology, public health, environmental engineering, risk assessment, modelling, and data science. Sectors of all types including policy and regulation, academic and clinical research, and environmental protection are valuable. We will actively recruit participants prior to and during the conference. The workshop participants will be expected to contribute and participate through group discussion (full group and in small-groups), problem-driven activity work with discussion and delivered outputs, and key research idea and gap synthesis to provide recommendations and knowledge after the workshop.
Workshop Schedule and Duration A summary of the structure and flow of the workshop, including: • Key session components • Interactive or breakout activities	1. Workshop Goals (Kerry Hamilton) [5 min] 2. AMR public health scoping for water safety planning and QMRA (Anne Roiko/Susan Petterson) [10 min] 3. Expanding empirical approaches to inform risk modeling; use of enrichment coupled with metagenomics for risk assessment (Eddie Cytryn/Kseniia Erokhina) [10 minutes] 4. Risk modeling needs and overview of activity [10 minutes] (Kerry/Hunter) 5. Breakout groups (main “activity”): a. What are the key public health questions? (20 min) b. What are the connection points to the questions in (a) for each exemplary situation/sector? Create a “roadmap” for your example (20 min) c. How can different tools (e.g., omics, QMRA) be used to identify and manage emergent critical control points? What might an

	integrated workflow look like? What are the data “needs” to complete this assessment? (20 min) 6. Report back and relation to risk management, major policy-relevant risk questions. [20 min] Current total time: 2 h