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

WORKSHOP OVERVIEW

Workshop Title	Ecologically relevant microbial endpoints for environmental water quality guidelines
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	Monique Binet, Andrew Harford, Erica Donner, Claire Hayward, Nick Ashbolt, Anthony Chariton (Panel and discussion contributions anticipated from representatives of DCCEEW, SAAFE-CRC, SETAC AU)
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.	Significant international effort has been directed toward deriving predicted no effect concentrations (PNECs) for antimicrobials to support environmental risk assessments (ERAs) with the dual aim of managing risks to human health through antimicrobial resistance (AMR) emergence, and ecotoxicological effects to ecosystems. Recognising the urgency for action, the World Health Organization has published PNECs for antimicrobials in wastewaters. However, there remains substantial uncertainty and ongoing debate regarding the most appropriate methods to underpin AMR risk assessment. The debate has largely focused on the use of 24-h growth inhibition endpoints for clinical isolates (minimum inhibition concentrations, MICs) compared to longer exposures (up to 7 d) of complex microbial communities extracted from sewage using growth inhibition or AMR selection-based (q-PCR) endpoints (minimum selective concentrations, MSCs). While these approaches have some relevance in point-source contexts such as antimicrobial manufacturing and wastewater treatment, their broader environmental applicability remain uncertain. In particular, there is limited understanding of how well these endpoints translate to more complex and environmentally relevant systems. Key questions include whether current endpoints can capture risks associated with AMR emergence and microbial responses in natural environmental microbiomes across freshwater, marine, wildlife, agriculture and aquaculture settings, let alone non-antimicrobial toxicants that co-select for AMR. More fundamentally, there is a need to critically evaluate whether the current suite of microbial endpoints is sufficient to characterise ecological impacts. Existing approaches are dominated by short-term growth-based assays, and it remains unclear whether these adequately reflect chronic, functional changes in microbial communities (such as C, N, P-cycles, biofilm dynamics and holobiont health) that underpin ecosystem processes. Addressing these gaps requires not only expanding the range of candidate endpoints, but also systematically testing their performance, understanding their uncertainty, and establishing their domains of applicability across environmental contexts. This workshop will bring together expertise across microbial ecology, AMR, and environmental risk assessment to critically evaluate current methods and identify practical pathways for testing, validating and applying microbial endpoints, including AMR emergence, within hazard concentration (PNEC or guideline value) derivation for broader environmental risk assessment frameworks.
Workshop Aims A description of the purpose of the workshop and its intended focus. This section highlights what participants can	This workshop builds on work initiated by SETAC AU, extending the discussion to an international audience at EDAR8. It aims to:

expect to explore, learn, or develop during the session.	1. Exchange international experience and regulatory perspectives on the development and application of frameworks addressing microbial ecological impacts and AMR. 2. Critically evaluate existing microbial endpoint approaches used in deriving guideline values and PNECs, with a focus on their applicability across contaminant types, environmental settings, and regulatory contexts. 3. Assess the suitability, limitations, and uncertainty of current methods, including whether ecologically relevant microbial endpoints can be generalised for 'default' use or require context-specific application (e.g. manufacturing wastewaters versus broader point and non-point discharges, and their role in whole effluent toxicity testing). 4. Identify priorities for testing, validation, and standardisation to improve confidence in microbial endpoints and support their integration into regulatory frameworks. 5. Strengthen international collaboration pathways between SETAC AU, EDAR, and the broader microbial ecotoxicology and AMR communities to enable coordinated research, pilot studies, and guidance development. Participants will develop a clearer, shared understanding of the challenges and opportunities associated with applying microbial endpoints in environmental regulation. In particular, the workshop will clarify how internationally developed methods can be tested, adapted, and implemented to suit diverse environmental contexts, while improving confidence in their use for guideline value derivation and broader risk assessment.
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).	This workshop will not be skills-based but will deliver tangible outputs and shared understanding across the microbial ecology, AMR, and regulatory communities. Participants will leave with: • A refined set of priority actions and next steps for incorporating microbial-based endpoints into regulatory frameworks. • A consolidated view of definitions, assay suitability, and data requirements for functional microbial endpoints (e.g., enzyme activity, resistome expression, nutrient cycling) informed by internation expertise. • Identification of agreed pathways for endpoint testing and validation, including key uncertainties and evidence gaps. A clearer understanding of opportunities for international alignment including collaboration and potential harmonisation of regulatory approaches.
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	This workshop will accelerate international efforts to recognise microbial processes as essential components of ecosystem health within environmental regulations. It will support an Australian Government initiative to develop fit-for-purpose water quality guideline values that reflect both ecosystem integrity and One Health outcomes. By engaging national and international experts in microbial ecology, AMR, and environmental risk assessment, the workshop will: • Bridge the gap between microbial science and regulatory practice by defining *ecologically relevant microbial endpoints* that can be operationalised within regulatory frameworks. • Build consensus on approaches for testing, standardisation, and validation, improving confidence in microbial data and supporting their integration into guideline derivation and risk assessment. • Clarify the applicability and limitations of current methods, including key uncertainties and their relevance across different environmental contexts and contaminant types. • Strengthen international collaboration and coordination between EDAR, SETAC, SAAFE, and regulatory agencies to enable joint projects, pilot studies, and guidance development.

	• Advance the development and uptake of chronic functional assays, supporting the inclusion of microbial endpoints in environmental monitoring and decision-making. Ultimately, the workshop will contribute to harmonising environmental and One Health approaches by promoting microbial endpoints that better represent ecosystem function, integrity and resilience.
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)	Target participants: National and International microbial ecologists, AMR researchers, environmental microbiologists, ecotoxicologists, environmental risk assessors, regulators, water authorities, industry representatives related to water, and consultants involved in environmental guideline derivation and application. The session will rely on active participation through structured discussion and collaborative problem-solving. Participants will be invited through the SETAC AU, ACTRA, SAAFE, and EDAR networks, ensuring balanced representation across science, policy, and practice sectors.
Workshop Schedule and Duration A summary of the structure and flow of the workshop, including: • Key session components • Interactive or breakout activities	Format: 1. Framing the challenge (15 min): A focused introduction to establish the scientific and regulatory context, including: ○ The development of international PNECs for antimicrobials (e.g. manufacturing wastewaters) and challenges in transferring these into broader regulatory frameworks. ○ The growing need to regulate chemicals in aquatic environments that drive AMR selection and co-selection, within a One Health context. ○ The central question for the workshop: *Are current microbial endpoints and methods fit-for-purpose across diverse environmental settings, or do they require further testing, validation, and context-specific application*? 2. Structured Breakout discussions (60 min): Participants will work through guided questions designed to evaluate applicability, uncertainty, and validation needs of microbial endpoints: a) Applicability of endpoints for default vs context-specific use • Existing PNECs for antimicrobials are largely derived for wastewater contexts. What microbial endpoints and data are required to extend or adapt these for broader point and non-point discharges to natural receiving water? • Which endpoints are suitable for "default" application, and which require site-specific interpretation? • To what extent do current approaches (e.g. pathogen-based assays) reflect a One Health perspective across human, animal, crop and environmental systems? Participants will be given a table of microbial endpoints and asked to add anything missing and consider amongst them which are most applicable for default or site-specific settings, and which could be modified for use in default settings. b) Representing relevant microbiomes • Which microbiomes (e.g. wastewater, sediments, biofilms, wildlife-associated systems) should be prioritised in hazard assessment? • How does endpoint relevance shift across these systems? c) Testing, validation, and uncertainty

	• What are the key sources of uncertainty in current assays and endpoint estimations? • Where are the critical evidence gaps limiting regulatory uptake? • What practical steps can be taken now to improve standardisation, validation, and cross-jurisdictional usability of microbial data? 3. Synthesis & Reporting Back (45 min): Facilitated discussion to consolidate outputs, including: • Priority endpoints and their domains of applicability (default vs site-specific). • Key uncertainties and validation needs. • Agreed next steps for testing, standardisation, and collaboration.