Objective(s)

To understand how toxicants impact waterway function to support monitoring, reporting and interpretation of measures of waterway function as a new environmental value in the next Healthy Waterways Strategy. Additional objectives relate to understanding how toxicants affect stormwater wetland performance.

Why this research is important

The Healthy Waterways Strategy 2018 defines a healthy waterway as one that maintains its ecological structure and function over time. However, Melbourne Water currently only assesses changes to ecosystem structure. This project will enable Melbourne Water to consider function alongside structure in monitoring programs and to assess the impacts of toxicants to ecosystem function. Functional indicators can also assist in understanding the impacts of toxicants on the performance and maintenance of Melbourne Water's stormwater wetlands.

Contribution to Melbourne Water research priorities

Key Research Area: Water Quality and Wetlands and estuaries - Develop methods, metrics and strategic management frameworks for waterway function as a key environmental value; and improving the stormwater treatment performance and determine the optimal maintenance of WSUD systems.

Achievements to date

This research is being delivered through a collaboration between A3P and MWRPP.

Information Synthesis- a review of the literature and current knowledge around waterway functional indicators has been completed (Burrows et al., 2024).

Method development Tea bag decomposition, algal biomass and Ecoplates trialled using sediment collected from stormwater wetlands.

Field Trials to validate functional indicators
Streams- Ecoplates were trialled in Spring 2024 in Dandenong Creek. In Autumn and Spring 2025 decomposition and Ecoplates were tested at Jacksons, Dandenong & Woori Yallock creeks.

Stormwater wetlands- Investigated relationship between toxicants and function at 6 wetlands.

Impact of pollutants on sediment microbial communities (PhD) Journal paper published. Presented at SETAC EU May 2025, SETAC NZ Aug 2025

Approach for Year 3

- Continue field validation of functional indicators to understand temporal variation (at 2 streams)
- Synthesise data from Years 2 and 3, analysis and interpretion, begin to benchmark natural variation versus stress response.
- Use 'omics' techniques to assess impacts of toxicants on microbial function

Key outputs for Year 3

- Data collected from streams and stormwater wetland trials, analysed and interpreted
- Results of 'omics' trial assessment available
- Development of scientific paper outlining the field trials/ impacts of biotic and abiotic stressors on waterway function.
- Begin benchmarking datasets to determine natural variation versus environmental stressors.

Expected benefits

- Guidance to Melbourne Water on the impacts of toxicants on waterway function to support the inclusion of waterway function as a new value in the next HWS.
- Identify where actions to improve water quality are necessary to support healthy waterway function.
- Guidance to Melbourne Water on how toxicant data collection can complement assessments of waterway function as part of the HWS MERI.
- Recommendations for improving the design and maintenance of stormwater wetlands to reduce the risk of toxicants on reduced stormwater wetland performance.

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A3P Aquatic Pollution Prevention Partnership

Melbourne Water

A collaborative research partnership delivering practical management solutions to reduce pollution in our waterways