

OVERVIEW

The Environmental Water Science Group comprises a number of research-active academics primarily within the School of Environmental and Life Sciences who have an underlying interest in all aspects of water science and who undertake collaborative research.

Water is a basic component of human existence and the support system on which people and ecosystems depend. It is one of the most fundamental requirements for the survival of all living things.

The academics in this research group study its importance to ecosystems and humans, its use and management as a resource, and its modification through contamination and pollution. The impact of pollutants on organisms in the environment (ecotoxicology) is a key aspect of the research undertaken by members of the group.

OBJECTIVES

The objectives of the group are twofold:

1. To undertake research on the quantity and quality of water and wastewater systems with specific focus on environmental impacts of decentralised infrastructure planning such as rainwater tank systems, on-site wastewater treatment systems (such as constructed wetlands), health of natural wetland habitats, catchment runoff and urban water quality, transport of contaminants through soil and the unsaturated zone, and monitoring strategies to further evaluate the impact of contaminants in rivers, estuaries and lake systems.

2. To examine the effects of pollutants on freshwater, estuarine and marine biota, and their response to pollutant stressors. Biological responses in organisms may be employed as surrogates and be a more informative tool in assessing the impacts of pollution than chemical contaminant measures alone. As well as ecotoxicology and approaches to remediating aquatic contamination, the group is also interested in the physiology of aquatic organisms and the ecology of freshwater, estuarine and marine environments.

To meet these objectives, the group uses a variety of field monitoring instruments and has access to chemical and biological instrumentation in modern laboratories for water and specimen assays.

Techniques used include chromatography and spectrometry including PCR analysis, metal assay, faecal sterol analysis and faunal identification and enumeration.

Instrumentation includes GC-MS, ICP-MS, ESI-MS, X-ray diffraction, electron diffraction, NMR, real-time PCR system, and flow-through respirometry. Natural synergies exist within the members of the group and there have been substantial benefits from the sharing of infrastructure.



EXAMPLES OF CURRENT PROJECTS

- The Use of Fluorescent Whitening Compounds as Indicators of Human Faecal Contamination in Environmental Waters
- Molluscan/Fish Biomonitoring for Quantification and Impact Assessment of Endocrine Disrupting Chemicals in Marine and Freshwater Ecosystems
- Enhancing the Bioremediation of Hydrocarbon Contaminants in Soil
- Source Tracking using Alternative Faecal Indicators in Water
- Evaluation of Nutrient/Microbial Exports from Unsewered Areas
- The Metabolic Response of Staphylococci to Environmental Stressors
- Characterisation of Microbial and Chemical Contaminants, Bioreaction and Water Quantity Dynamics in Rainwater Harvesting Systems to Optimise Design

RESEARCH OUTCOMES

Members of the group have been very successful in gaining nationally competitive research grants and industry funding. The research has resulted in numerous publications in high impact journals ranging in specialisation from chemistry and biochemistry to applied environmental science, water resources management and toxicology. There are also a number of research Higher Degree students undertaking projects under the supervision of group members.

EXTERNAL COLLABORATORS

There are a number of external funding partners involved in the Group's research projects. These include the Australian Research Council (Linkage and Discovery), Hunter Water Corporation, NSW Government Departments (Industry and Investment; Environment, Climate Change and Water; Food Authority), Port Stephens, Great Lakes and Lake Macquarie Councils, Tom Farrell Institute for the Environment, Bluescope Steel, Veolia Environnement, Enviropacific Services, Newcastle Innovation and others.

GROUP MEMBERS

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