The University Of Queensland
AUSTRALIA

CREATE CHANGE

QAEHS Annual Report

2021-2022

Contents

Our Alliance with Queensland Health

Our research is guided by our vision to improve human health through environmental health science. Working in partnership with Queensland Health our mission is to address local, national, and global environmental health science challenges and achieve world-class outcomes in research, training, and partnership engagement, while meeting the needs of Queensland and the wider community.

Our researchers provide extensive academic and scientific expertise focussed on managing environmental sources of risk to human health.

Key objectives:

- Provide opportunities for Queensland Health, through enhanced engagement with the research sector, to influence the research agenda in the field of environmental health science
- Build the capacity of key Queensland Health staff to assess and manage risks to human health from environmental threats
- Encourage ongoing innovation and research in the environmental health science field
- Facilitate access for Queensland Health staff to scientific and academic environmental health experts from the university research sector to ensure government policy and advice reflects the latest scientific findings.

Director's report

This year, the *Queensland Alliance for Environmental Health Sciences*' two-year extension period was awarded in July 2021 extending the centre's 2018-21 partnership with Queensland Health to June 2023.

Over the past seven years, and notably the last two due to the pandemic, QAEHS has displayed versatility in its ability to adapt to change and, together with Queensland Health, this has enabled us to adjust our approach to the way we work and develop new responses to emerging issues.

Our partnership with Queensland Health and CSIRO to deliver the state-wide wastewater surveillance program for SARS-CoV-2 has continued this year. Results from this program have provided Queensland Health with supporting data on the levels of SARS-COV-2 across Queensland and contributed to Queensland Health's comprehensive response to the COVID-19 pandemic.

Over the past 12 months, QAEHS has delivered nationally and internationally recognised outcomes highlighting the valuable role our research plays in the environmental and human health field. Our continued success across national and international competitive funding programs this year has resulted in $14 million of new investment across our broad interdisciplinary research program. I would especially like to highlight the significant success of four QAEHS researchers being awarded new fellowships this year – this is a fantastic achievement and a testament to the high significance of the work we all do.

QAEHS Theme Leaders and researchers remain highly productive managing their current research programs, new awarded projects, identifying priority environmental and human health issues and preparing new grant applications to address them, and continuing to diversify their programs by broadening their collaboration networks and funding opportunities.

We continue to exceed our competitive grant leveraging target of 15% of Queensland Health's total investment in the centre – this year reaching 55% of Queensland Health's total investment between 2018-2022, converting to $10.5 million in research returns to the department.

This year we welcomed three new researchers and three professional staff to the QAEHS team. Eight students completed their PhD and 15 new PhD students have joined the team.

Student enrolment numbers in our *Master of Environmental Health Sciences* program have increased again this year, up by 13% on last year's enrolments.

A highlight of 2021 came from co-hosting the International *Testing the Waters 5* Conference on wastewater-based epidemiology in Brisbane in September 2021. The hybrid event accommodated in-person and virtual attendees, and attracted 409 delegates from across the world, with representation from Australian and international government agencies, water utilities, law enforcement, lab equipment suppliers and universities and research institutions.

In addition to our regular research program activities, we have three significant special projects underway. Construction of one of the world's first plastics contamination-controlled laboratories has been completed within our lab facilities at the University of Queensland's PACE building at Woolloongabba. *The Minderoo Centre – Plastics and Human Health* has been established and research on further understanding human exposure to plastics and additives they contain is gaining momentum. The ARC Linkage Infrastructure, Equipment and Facilities grant awarded to Prof Jochen Mueller to fund the construction of the *Australian Environmental Specimen Bank* to be housed at the University of Queensland's Long Pocket precinct will be completed and fully operational in early 2023. Additionally, the National Drug Wastewater Monitoring Program, a three-year partnership with the Australian Criminal Intelligence Commission and the University of South Australia, is well established and now in its sixth year.

As you read through the strategic and operational overview of the *Queensland Alliance for Environmental Health Sciences* presented in this report, you will find all the highlights from our work this year.

I would like to acknowledge and thank all who have contributed to our activities and outcomes this year.

Prof Kevin Thomas, Director

2021–22 Snapshot

Meaningful collaborations with national and international organisations

22 Government/Industry

29 Research

244 media mentions* potentially reaching **225M** people

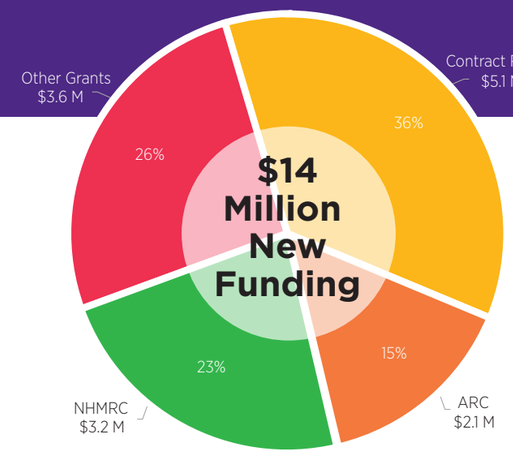
* Media mentions are a reference to a keyword (QAEHS) across all types of media.

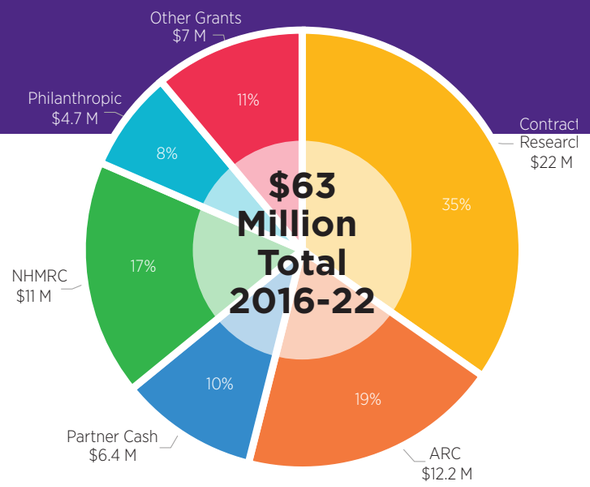
175 Publications

20,934 Citations from **121** Countries

SARS-COV-2 in Wastewater

Continued delivery of the state-wide wastewater surveillance program for SARS-COV-2, partnered with Queensland Health and CSIRO.

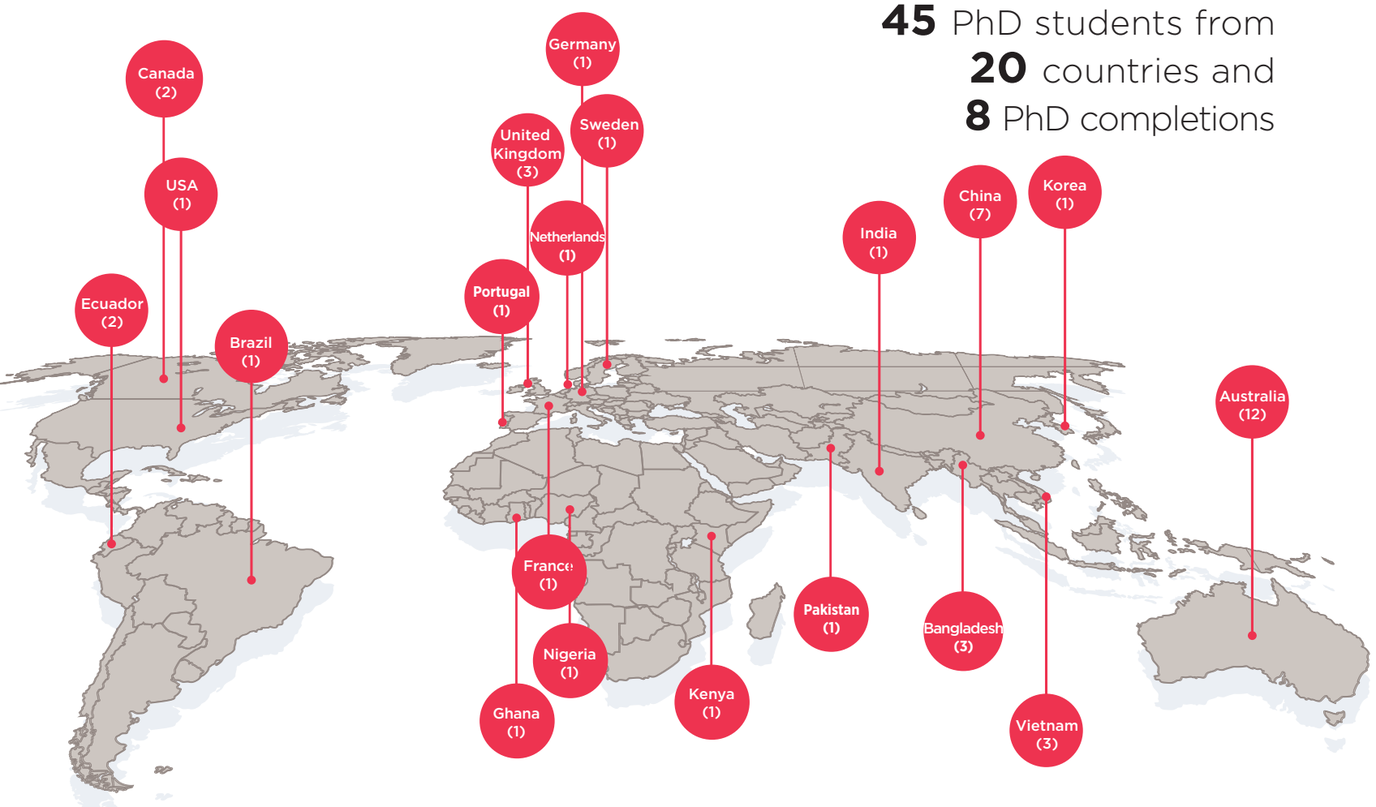




Masters of Environmental Health Sciences

13% increased enrolments

No. 2 in Australia for public health



45 PhD students from **20** countries and **8** PhD completions

4 new Fellowships

60% success rate on competitive grant applications

‘Testing the Waters 5’ Conference

3 Days

47 Presentations

409 Attendees

Special Projects

Australian Criminal Intelligence Commission

Minderoo Foundation

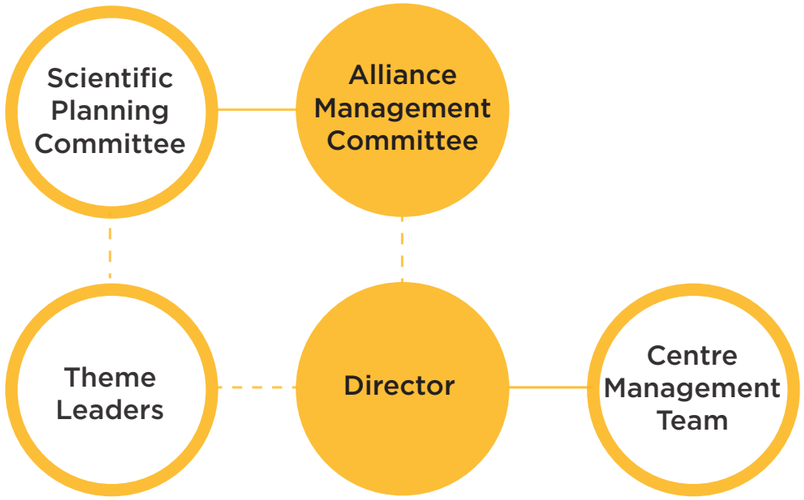
Australian Environmental Specimen Bank

Governance.

Our Centre is governed by the Alliance Management Committee (AMC), responsible for the strategic direction and oversight of the centre's activities. It comprises an independent Chairperson, two members from the University of Queensland, two members from Queensland Government and the Director of the Centre.

The AMC has one sub-committee, the Scientific Planning Committee (SPC), which provides advice and support to the Director and the AMC in ensuring that the Centre's research is coordinated, collaborative, relevant and complimentary across all research themes. The SPC comprises the Director, QAEHS theme leaders, and Queensland Health and University of Queensland research executives.

QAEHS operations are managed by the Director and a small administrative team and are supported by the University of Queensland.



Alliance Management Committee

The Alliance Management Committee provides expert, balanced and timely advice and oversight on the Centre's strategic direction and activities to ensure that QAEHS, through the Director and the Scientific Planning Committee, continues to lead in environmental health sciences research, education, innovation, impact, and engagement in Australia and globally.

MEMBERS

Dr Jenny Stauber (Chair), Chief Research Scientist, CSIRO

Professor Bruce Abernethy, Executive Dean, Faculty of Health and Behavioural Sciences, University of Queensland

John Piispanen, Executive Director Health Protection Branch, Queensland Health

Dr Mark Jacobs, Deputy Director-General Science and Technology Division, Queensland Department of Environment and Science

Professor Greg Montieth, Associate Dean (Research) Faculty of Health and Behavioural Sciences University of Queensland

Professor Kevin Thomas, Director, Queensland Alliance for Environmental Health Sciences

YEAR IN REVIEW

The 2021-2023 Strategic Plan was revisited, presented, discussed, and endorsed by the AMC. The future focus of the Centre's research program, including identification of potential future research directions, was implemented in the 2021-23 strategic plan.

Focus on enhancing communication avenues for current research activities and dissemination of outputs through a series of videos, and further website upgrades.

Scientific Planning Committee

The Scientific Planning Committee (SPC) functions at an operational and strategic level to ensure that the Centre's research in environmental health is conducted in a coordinated fashion across our themes of research to meet the needs of all stakeholders, maximise quality and quantity of scientific outputs, and to promote industry and government linkages nationally and internationally. The Scientific Planning Committee includes stakeholders as members, to ensure collaboration and continued relevance to their current needs and challenges.

The format of SPC meetings focuses on promoting multidisciplinary research across the themes. Each meeting focusses on a broad topic and Theme Leaders present their existing or potential contributions to the field, followed by a wider group discussion to identify relevance, future research direction and potential collaborations.

MEMBERS

Professor Kevin Thomas, Director, Queensland Alliance for Environmental Health Sciences

Professor Greg Montieth, Associate Dean (Research) Faculty of Health and Behavioural Sciences University of Queensland

Dr Greg Jackson, Director, Water Unit, Queensland Health

John Doherty, Executive Director, Queensland Health Forensic and Scientific Services

Dr Gilda Carvalho, Theme Leader, University of Queensland

A/Prof Jianhua Gao, Theme Leader, University of Queensland

Professor Kelly Fielding, Theme Leader, University of Queensland

A/Prof Nick Osborne, Theme Leader, University of Queensland

A/Prof Abdullah Mamun, Theme Leader, University of Queensland

Professor Jochen Mueller, Theme Leader, University of Queensland

A/Prof Linda Selvey (to Apr 2022), Theme Leader, University of Queensland

Dr Dung Phung (from Apr 2022), Theme Leader, University of Queensland

Professor Jack Ng, Theme Leader, University of Queensland

INVITEES

Janet Cumming, Queensland Health Buddy, Queensland Health

Daniel Francis, Queensland Health Buddy, Queensland Health

Suzanne Huxley, Queensland Health Buddy, Queensland Health

Clive Paige, Queensland Health Buddy, Queensland Health

Uma Rajappa, Queensland Health Buddy, Queensland Health

Rebecca Richardson, Queensland Health Buddy, Queensland Health

YEAR IN REVIEW

Focussed meeting topics this year included:

- Air Quality
- UQ's Queensland Alliance for One Health Sciences initiative and potential for collaboration
- Collaboration with Queensland Health Forensic and Scientific Services

The Committee discussed high priority research areas and identified possible inter-theme collaborations for new funding opportunities.

A facilitated workshop has been developed on GIS and data sciences, an identified high priority area for Queensland Health. The workshop is intended as a professional development training opportunity for Queensland Health.

Wastewater-Based Epidemiology (WBE) was identified as a high priority topic and a virtual symposium comprising a series of video presentations on QAEHS' current work in this area was developed for Queensland Health staff.

Deliverables.

The 2021-22 performance towards deliverables defined in the 2018–2023 Queensland Health contract are individually addressed in the subsequent sections of this report.

Strategic Direction

QAEHS collaborates broadly with government policy makers, regulators and clients, industry practitioners and other research experts to address local, national, and global environmental health science challenges. Through our research and education themes, we continue to deliver first class outcomes in research, training, and partnership engagement, providing social and economic benefit to Queensland and the wider community.

Our 2021-22 achievements in meeting the ongoing strategic goals and objectives of the Centre are summarised in the table adjacent.

Looking ahead

The Centre's strategic direction was updated in 2021, provided to the AMC for feedback, refined and endorsed in May 2022.

The 2021–2023 plan focusses on maintaining delivery of a high quality and dynamic program of interdisciplinary research that solves current and emerging global environmental health challenges, an education and training program that builds national capability, and provision of science-based knowledge that leads to policies aimed at improving health outcomes.

Key goals

Research

Regularly refresh and re-focus research theme priorities to achieve cross-theme collaboration, translation, and uptake of QAEHS research into Queensland Health operational activities

Value

Continue to diversify income streams to enhance the value of research return to Queensland Health

People

Foster, mentor and develop the next generation of key early and mid-career researchers in environmental health sciences

Education

Promote the Master of Environmental Health Sciences Program with increased flow of research project students through QAEHS and maximise our efforts to attract exceptional domestic and international PhD students

Communication

Deliver effective mechanisms of communications and engagement to ensure widespread promotion of the Centre's activities

Collaboration

Be the conduit between Queensland Health and the global environmental health science research networks and international best practice.

Achievements against strategic plan 2020–21

Strategic Goal	Objectives	Measures of Success	Achievements 2021-22
Identify and contribute to solving current and emerging national and international environmental health challenges	Establish a program of high-quality interdisciplinary research	• Grant income • Peer-reviewed publications • Conference presentations • HDR completions	• New grant funding of $2.1M ARC, $3.2M NHMRC, and $4.4M in contract research • 175 peer reviewed publications • 58 conference presentations • Eight HDR completions.
Build an expert capability in the environmental health sciences	Maintain and develop an Environmental Health Sciences education and training program	Established training program, stakeholder for a Masters of Environmental Health	• Masters of Environmental Health Sciences is ranked number 2 in Australia for public health (Global Ranking of Academic Subjects 2021) and number 19 in the world for environmental sciences (QS World University Rankings 2022). • Student enrolments continue to increase, with 33 students enrolled in 2021-22, up 13% on 2020-21. • QAEHS student numbers: 45 PhD, 1 honours and 1 Masters
To be Australia's internationally recognised research centre within the environmental health sciences	Engage with internal and external partners to deliver transdisciplinary environmental health science	Representation on national and international advisory and expert panels. Number of publications co-authored with non UQ co-authors	• QAEHS theme leaders are represented on many national advisory and expert panels – refer to Appendix E. • Of the 177 reported research publications, 157 were co-authored by non-UQ co-authors.
Provide science-based knowledge to Queensland Health and the wider community	Work with Queensland Health to target and deliver improved health outcomes for Queenslanders Provide a working environment that fosters interdisciplinary research	• Translation of science to policy • QAEHS sought after by stakeholders as a provider of advice, Commissioned projects	• QAEHS managed the SARS-CoV-2 Wastewater Surveillance program which provided data analysis and advice to Queensland Health, contributing to the department's comprehensive response to the COVID-19 pandemic • Scientific Planning Committee meetings involve all theme leaders and focus on promoting multidisciplinary research across the themes. Queensland Health buddies are invited to SPC meetings to ensure targeted research topics, knowledge sharing and outcome translation for policy development.

Research.

Our research program is centred around eight integrated research themes. Development of our focused research activities is shaped by Queensland Health's needs and is refreshed regularly through continuous and collaborative dialogue to ensure the centre's activities are aligned with the department's current challenges.

Research Themes

ENVIRONMENTAL HEALTH TOXICOLOGY

Prof Kevin Thomas,
Theme Leader

Understand the harm that chemicals, substances or situations can have on people, animals and the environment through assessing exposure and effects.

EMERGING ENVIRONMENTAL HEALTH RISKS

Prof Jochen Mueller,
Theme Leader

Develop and conduct research, including sampling and archiving programs, that allow rapid recognition and identification of emerging health risks.

EDUCATION & PROFESSIONAL DEVELOPMENT

A/Prof Nicholas Osborne,
Theme Leader

Build capacity to assess, examine and respond to environmental health challenges in a changing world.

ENVIRONMENTAL HEALTH RISK COMMUNICATION

Prof Kelly Fielding,
Theme Leader

Promote and engagement approach to risk communication that develops capacity in experts and the community.

ENVIRONMENTAL HEALTH EPIDEMIOLOGY

A/Prof Abdullah Mamun,
Theme Leader

Draw on epidemiologic methods to advance understanding of how physical, chemical, biological, social and economic factors affect human health.

ENVIRONMENTAL HEALTH RISK ASSESSMENT

Prof Jack Ng,
Theme Leader

Advance knowledge through research, education and training to enable improved understanding of the source, exposure and toxicological effects of single and mixed environmental pollutants.

CLIMATE CHANGE & HEALTH

A/Prof Linda Selvey (2021),
Dr Dung Phung (2022),
Theme Leaders

Improve public health through research, education, advocacy and training on the health impacts of climate change and how best to ameliorate them through adaptation and mitigation.

ENVIRONMENTAL HEALTH MICROBIOLOGY

A/Prof Jianhua Guo,
Dr Gilda Carvalho,
Theme Leaders

Determine how microorganisms in the environment may be beneficial or harmful to human health or our activities.

The following research highlights are presented for the year outlining key activities that have taken place in 2021-22, theme leaders working in each space and numbers of research fellows and students, key funding sources including awarded, submitted, and planned future research applications and those supported by Queensland Health leveraging investment.

Wastewater surveillance for chemical and biological hazards (including SARS-CoV-2)

The ARC Linkage Project Understanding Australia by analysing wastewater during the Census 2021 (SewAus) commenced at the end of June 2021 and ramped up quickly to collect samples from 148 wastewater treatment plants across Australia during the week of the August 2021 census. Sites that provided influent have now been analysed for licit and illicit drugs (such as methamphetamine, cocaine, nicotine, and paracetamol). The first batch of census data were released, and the team have been working to update the catchment maps linked with the associated population. We are now preparing to collect samples for 2022.

The samples collected annually for the SewAus projects (2021 and 2016) provide invaluable data to a number of different projects at QAEHS, including several PhD student projects. In 2021-2022, four PhD students using these samples for their PhD projects submitted their theses: Rory Verhagen submitted his thesis on innovative sampling technologies for wastewater-based epidemiology (WBE), Fahad Ahmed's PhD project provided an assessment of population treated pain and gout burden using WBE, Qiuda Zheng submitted his thesis on estimation of alcohol and tobacco consumption by WBE, and Dr Elvis Okoffo successfully completed his PhD on a quantitative assessment of plastic residues in Australian biosolids.

Professor Kevin Thomas and Dr Phong Thai have been working to refine the excretion of the tobacco alkaloids anabasine and anatabine to enable more accurate prediction of tobacco consumption in the general population through wastewater. Cohort recruitment has been completed. The aim for the next stage of the research is to identify novel biomarkers of vaping. Dr Thai is now working with the ATO who are interested in using wastewater to estimate tobacco consumption. Dr Thai has also submitted a journal article for publication on WBE research showing that tobacco consumption has increased in Australia during COVID.

In 2021-2022, we continued our work with Queensland Health and CSIRO to deliver the wastewater surveillance program for SARS-CoV-2. The program developed over this period, with the team first working to lower the limit of detection to detect the virus with a high degree of sensitivity when it was not yet prevalent in the population, then adjusting sampling strategies in 2022 to provide the most valuable information, such as wastewater concentration to help estimate COVID-19 case numbers. The papers on using wastewater-based epidemiology to detect and monitor SARS-CoV-2 published by the team in collaboration with CSIRO and QANTAS have been among the most cited in the world on this subject, highlighting the impact of this work. The team have continued working to adapt the approach to assess SARS-CoV-2 in cruise ship and aeroplane wastewater and this work has attracted attention from the Pandemic Prevention Institute, Rockefeller Foundation, who are interested in partnering with us in their endeavour to strengthen global surveillance capacity to protect health.

PhD student Katja Shimko has been working under the supervision of Professor Thomas to develop methods of detecting performance enhancing substances in wastewater in a project funded by Sports Integrity Australia. Of interest, they have looked at wastewater from across half Australia and have found at least one performance enhancing substance present in almost all (49 from 51) of the wastewater treatment plant samples examined, indicating just how widespread use of performance enhancing substances is. Ms Shimko and Professor Thomas are currently preparing a grant application to the Partnership for Clean Competition to continue funding this work.

Team

Theme Leaders:
Mueller, Thomas, Gartner
8 Research Fellows
8 PhD students

Key research funding

*ARC Linkage (Mueller, O'Brien, Tscharke, Thai, Kaserzon, Gartner, Carvalho)
ARC Discovery (O'Brien)
ACIC (NWDMP) (Mueller, Tscharke, O'Brien, Thomas)
Queensland Health (COVID-19) (Mueller, Thomas)
EU H2020 Marie-Curie Fellowship (Rousis, Thomas)
Sport Integrity Australia PhD Scholarship (Thomas)
Commonwealth Government (Mueller)
*ARC Linkage (Thomas, Thai)
ARC Discovery (Thai, O'Brien)
UQ HaBS (x3) (Li)

*QH leveraging funds

Planned Submissions

Submitted:

ARC Discovery Project (Thai, Tscharke)
ARC Discovery Project (Bade, Mueller, Tscharke)

Planned:

ARC Future Fellowship (Thai)
MRFF (O'Brien, Tscharke)
ARC Linkage Project (Mueller, Tscharke, Bade)
Partnership for Clean Competition (Thomas, Shimko)

Human biomonitoring and epidemiology

QAEHS's human biomonitoring research program has made great progress in 2021-2022, under the leadership of Professor Jochen Mueller. Thousands of new samples have been added to the Australian Environmental Specimen Bank (AESB), expanding our unique and invaluable dataset that allows us to track spatial and temporal trends in human exposures across a wide range of priority contaminants of concern (such as plastics additives, pesticides, PFAS, and personal care products) in cohorts across Australia and New Zealand. In fact, the AESB is expanding so rapidly that we have needed to hire another two freezers to get us through to when the new AESB freezer facility at Long Pocket, Indooroopilly, is completed. Due for completion in December 2022, the new AESB facility, funded by a successful ARC Linkage Infrastructure, Equipment and Facilities (LIEF) grant, will house a 114m2 -20°C freezer room as well as six -80°C freezers and two -150°C Vapour Phase systems. Design plans have been finalised and submitted for development approval.

Now in its second year, Professor Mueller's ARC Australian Laureate Fellowship program is progressing well. The Laureate program aims to develop effective tools to understand spatiotemporal trends and factors that drive chemical exposure by combining established programs in systematic sampling and archiving with advanced informatics and analytical techniques. Some of the exciting projects of the last 12 months include assessing the impact of COVID-19 and related lockdowns on population exposure, progressing new analytical methods for exposure assessment, assessing spatiotemporal trends of a wide range of chemical pollutants in archived air samples collected from across Australia over the past decade, and investigating temporal trends in exposure to a range of chemicals (including parabens, bisphenols, PAHs) using urine samples. Professor Mueller has been invited to contribute to the United Nations Environmental Program (UNEP) Global Monitoring Program Expert Committee and has established several key partnerships with government, industry, and academic collaborators.

Dr Sarit Kaserzon, Professor Mueller, and Dr Xianyu Wang were successful in attaining an ARC Linkage Project grant to investigate methods of reducing occupational exposure to glyphosate through developing new tools and refining methods for integrating human biomonitoring data with surveillance data on the pathways of glyphosate exposure from high use. The project will commence once collaborative research agreements are in place and is expected to generate important new knowledge on population-specific chemical exposures to inform public health policy.

Postdoctoral Research Fellow, Dr Chang He, was awarded a 2-year AXA Fellowship and has just started work investigating the biotransformation of contaminants of emerging concern (CECs) to discover new biomarkers and assess safety of emerging contaminants to help improve our understanding of human exposure to CECs.

In collaboration with Minderoo and Neuroscience Research Australia, the team at QAEHS have been developing methods to detect a range of chemicals and plastic particles in urine, blood and brain, discussed further under Plastics and Plastic-Related Chemicals.

A/Prof Abdullah Mamun, Theme Leader for Environmental Epidemiology, has had some successes in recruiting a postdoctoral fellow Mamun Huda and a higher degree research student (Gonzalo Silva) in 2021-22 to advance his theme. With the support of Queensland Health leveraging funds, he was awarded NHMRC Partnership funds to investigate the effect of exposure to trihalomethanes (THMs) during pregnancy on the risk of low birth weight. A/Prof Mamun recruited two students who were awarded International Postgraduate Research Scholarships and have commenced projects on THMs and the risk of adverse pregnancy and birth outcomes.

A/Prof Mamun is supervising PhD student Dr K M Shahunja, whose research aims to assess the trajectories of family, neighbourhood, and psychosocial environmental factors, and their impact on asthma in Australian children. He has published two research articles in peer reviewed journals and presented one paper at an international conference (virtual). Both of these published papers showed interesting findings in context of Australia and drew several public media attention (e.g., The Conversation, Science alert, Newsbreak, Medical Xpress, Medical Republic, SCIMEX, ABC radio Mt Gambier, Triple UFM, etc.). He has also written two more research articles from this project, with one currently under review for publication.

The Environmental Health Risk Assessment group led by Professor Jack Ng has been focusing on toxicity and toxicological interactions of mixed contaminants with a particular reference to metals and metalloids, and PFAS. The findings will afford a more refined health risk assessment of environmental chemical mixtures.

The in-vitro toxicological study of mixed PFAS using a human liver cell line has resulted in several high-quality publications and a PhD completion.

A study on metal/loid exposure to children who live near various industrial areas in Dhaka, a mega-city in Bangladesh, suggested a more stringent environmental monitoring/control is needed. Studies on the spatial and temporal distribution of metal/loids at and near large-scale shipwrecking activities indicated workers and nearby residents are being impacted. The uncontrolled release of contaminants is to blame.

A new PhD project has commenced under the supervision of Professor Ng that focuses on the metabolism of arsenic from the ingestion of either rice or water and understanding how the gut microbiome influences arsenic metabolism and ultimately its toxicity to humans.

Key research funding

ARC Laureate Fellowship (Mueller)
ARC Discovery (Mueller, Thomas)
*ARC LIEF (Mueller)
ARC LIEF (Mueller)
*ARC Linkage (Kaserzon)
*NHMRC Partnership (Mamun, Thomas)
NHMRC Project (x4) (Mueller, Thomas, Wang)
NHMRC-EU Collaborative grant (Thomas, Mueller, Wang, Rauert)
NHMRC-EU Collaborative grant (Mueller)
NHMRC-NAFOSTED Collaborative (Thai)
Minderoo Foundation (Thomas, Mueller)
Commonwealth government (Mueller)
AXA Fellowship (He)

*QH leveraging funds

Planned Submissions

Submitted:
ARC Discovery (Rauert, Thomas)

Planned:
ARC DECRA (Dewapriya)

Team

Theme Leaders:
Mueller, Thomas, Mamun, Ng

6 Research Fellows

8 PhD students

Per- and poly-fluoroalkyl substances (PFAS)

Professor Mueller and Professor Thomas and Associate Professor Fielding have established themselves as leading experts in Australian PFAS exposure science and communication. We receive significant funding through PFAS-specific initiatives from ARC (Special Research Initiative for PFAS remediation, three projects) and NHRMC (Targeted Call for Research (TCR), four projects related to human exposure to PFAS) and the U.S. Department of Defense (SERDP). In 2021-2022, we attracted further funding from the U.S. Department of Defense Environmental Security Technology Certification Program (ESTCP) to investigate management and mitigation of PFAS leaching from concrete in collaboration with Arcadis, as well as new contract research and consultancy projects with Arcadis and ExxonMobil and the Australian Commonwealth Government.

The ARC Special Research Initiative for PFAS remediation led by Professor Mueller, Remediation of PFAS contaminated soil using a soil washing treatment train, is wrapping up and is due to be completed in 2022. The project has, to date, provided a scientific basis for understanding the benefits and limitations associated with the soil washing technology developed for remediation of PFAS contaminated soils. We have found that the soil properties are not as important as the chemical properties of PFAS in determining sorption and fate. Expected outcomes include immobilisation techniques and an understanding of the biotransformation potential of PFASs from precursors remaining in the remediated soil. Our industry partners have been using the remediation technology to remediate Australian Defence AFFF-contaminated soils, with the treatment plant set-up on Defence land and have remediated/washed several thousand tonnes of AFFF-contaminated soils and concrete to date and counting.

The NHMRC TCR project led by Professor Mueller, which aims to assess the effectiveness of PFAS exposure control in exposed communities and firefighters, commenced in 2020. In 2021-2022, the team reported back to individual participants (both firefighters and community members, including participants from Oakey, Queensland) information about trends in their PFAS serum concentration. Professor Fielding has contributed her expertise to optimising the recruitment of participants, as well as providing risk communication advice in relation to reporting results from the project to participants.

The U.S. Department of Defense SERDP grant led by Dr Sarit Kaserzon aims to develop and validate a robust, modular suite of quantitative passive sampling tools for a range of PFAS to address the global issues of wide-spread contamination from per- and poly-fluorinated compounds. The monitoring tools developed have been calibrated and validated at a range of Australian Defence and U.S. DoD sites and applied to surface, ground and wastewater matrices. The tools have proven extremely sensitive and effective in sampling a wide range of PFAS with work continuing to (i) better characterise additional PFAS of concern, (ii) inform the environmental risk profiles from PFAS at sites across Australia, and (iii) inform PFAS remediation efforts. A first collaborative research paper has been published and preliminary findings have been presented at several international conferences. The tools developed have already been used by agencies worldwide to help PFAS investigation and monitoring efforts.

Dr Pradeep Shukla's Advance Queensland Industry Research Fellowship focused on developing a technology for treatment of PFAS contaminated fluids is in its final year. A demonstration plant has been developed that can treat landfill leachate at a rate of 25,000 L/day and is currently being trialled at Brisbane City Council's landfill site in Brisbane. The technology is available to be applied at any major PFAS contaminated site to treat PFAS polluted water.

Dr Xianyu Wang's NHMRC TCR project aims to characterise the PFAS exposure pathways of air inhalation, dust ingestion and dermal contact for exposed cohorts and evaluate the role of precursor exposure and biotransformation as a source for body burden of PFAS. In 2021-2022, the team established the sampling methodology for air, floor dust, and surface particle collection in residential homes in both the general population and in exposed communities (firefighting stations and Oakey). They have also developed a new analytical method for volatile PFAS.

Our human biomonitoring work with PFAS also includes a five-year follow-up study for firefighters with Airservices Australia. Nearly 800 individuals participated in the study, and in 2022 PhD candidate Sandra Nilsson submitted her PhD thesis which aimed to determine the current PFAS serum concentrations in Australian firefighters and investigate trends of PFAS exposure in association with work history.

Following on from this work, Postdoctoral Research Fellow Dr Pradeep Dewapriya has been developing a protocol to identify novel PFAS using cows and has just started human work with firefighters.

Postdoctoral Research Fellow Dr Emma Knight was successful in securing funding in UQ's newest internal grant scheme for early career researchers, the UQ Knowledge Exchange and Translation Fund Award, which aims to support early career researchers to develop and build relationships with research end-users. Dr Knight's project looks at the leachability of PFAS and their precursors into food from compostable food contact materials, in collaboration with Planet Ark and PFAS Free Australia. Dr Knight, Dr Sarit Kaserzon, and Dr Wang are now working with industry partners to put together an ARC Linkage Project application investigating the chemicals (including PFAS) present in food contact products available in Australia and how they persist in the recycling and compost reuse streams.

Risk communication is an important element in the NHMRC TCR PFAS and Health grants. Through these projects, A/Prof Fielding and colleague, Dr Kylie Morphett, will deliver important insights about how to communicate about PFAS. In addition, data has been collected or is planned on:

- A cross-country analysis and comparison of fact sheet about PFAS. This analysis is collecting data on the content, format, and quantitative and qualitative risk messages about PFAS (data collection in progress),
- Australians' interpretation, understanding and trust in government developed PFAS fact sheets (data collected and analysed, publications in preparation), and
- Knowledge and beliefs about PFAS exposure pathways amongst those at risk of higher levels of exposure (ethics application in progress).

Key research funding

*ARC Special Research Initiatives (x3) (Mueller, 2 x external)
NHMRC Targeted Call for Research (x4) (Mueller, Thomas, Fielding, Wang)
Advance Qld Industry Res Fellowship (Shukla)
U.S. DoD SERDP (Kaserzon, Mueller)
Airservices Australia (Mueller)
Advance Queensland Women's Research Assistance Program (Ghorbani Gorji)
Arcadis and Exxon Mobil (Thai, Mueller)
UQ Amplify (Shukla)
UQ Knowledge Exchange and Translation (Knight)
Commonwealth Government (Shukla, Thai)
U.S. DoD ESTCP (Mueller, Thai)

*Qld Health leveraging funds

Planned Submissions

Submitted:
U.S. DoD SERDP (Mueller, Thai)
ARC Linkage (Wang)

Planned:
ARC Linkage Project (Knight, Kaserzon, Wang)
ARC Linkage Project (Dewapriya)
ARC DECRA (Knight)

Team

Theme Leaders:
Mueller, Thomas, Fielding, Ng
6 Research Fellows
9 PhD students

Microbiology and anti-microbial resistance

Antimicrobial Resistance (AMR) is internationally recognized as a global crisis, projected to cost the global economy US$100 trillion and cause 10 million deaths per annum by 2050. Theme Leaders A/Prof Jianhua Guo and Dr Gilda Carvalho are leading a team (3 postdoctoral fellows and 5 PhD students) focused on the understanding of the emergence and spread of antimicrobial resistance (AMR) in the environment, and efficient solutions to mitigate the adverse impacts of AMR. Their team found that non-antibiotic pharmaceuticals contribute to the spread of AMR, which has substantially augmented our understating of the causes of AMR. They have published more than 30 papers on this topic alone in top-tier journals, including 10 Nature-index journal papers and an invited perspective in Science. Their findings have been covered by many mainstream media outlets, including ABC News, The Daily Mail, Science Daily and The Courier-Mail.

Under the guidance of Queensland Health colleagues (e.g., with Dr Greg Jackson, Director of the Water Quality Unit) Associate Professor Guo and Dr Carvalho have increased research activities in health-related water microbiology issues. The team has developed culture-dependent and culture-independent methods to address the problems of waterborne opportunistic pathogens in drinking water supply systems, with a focus on Legionella and Nontuberculous mycobacteria.

Associate Professor Guo, Dr Carvalho, and researchers Dr Jake O'Brien and Professor Thomas are founding members in the recently awarded Cooperative Research Centre CRC SAAFE: Solving Antimicrobial resistance in Agribusiness, Food & Environments. The Federal Government awarded $34.5M in grant funding to leverage more than $112M in cash and in-kind contributions from 53 partners, including Queensland Health (leveraging funding). The new Cooperative Research Centre will address the impacts of Antimicrobial Resistance on Australia's agribusinesses.

In the last year, Theme Leaders A/Prof Jianhua Guo and Dr Gilda Carvalho have been involved in 20 publications related to Environmental Health Microbiology.

Dr Jake O'Brien was awarded a 5-year NHMRC Investigator Fellowship to use wastewater analysis to provide a surveillance strategy for monitoring antimicrobial resistance in the general population and to develop a national wastewater surveillance program for AMR. So far, Dr O'Brien has developed a direct injection LC-MS/MS method for the ultra-trace determination of >60 antimicrobial compounds in wastewater influent on a state-of-the-art SCIEX 7500 system, currently undergoing method validation. Dr O'Brien was also awarded some funding from Melbourne Water to conduct preliminary investigations relating to the role of cyanobacterial blooms in the amplification and dispersal of antimicrobial resistance.

This past year we also saw the establishment of the Queensland Alliance for One Health Sciences, which includes Professor Kevin Thomas, A/Prof Jinhua Guo, Dr Gilda Carvalho, and Dr Jake O'Brien.

QUEX PhD student Leah Clarke has continued her project on characterisation of novel substance in wastewater that select for antimicrobial resistance. Jinglong Li also started his PhD project at QAEHS looking into antibiotics and other chemicals that select for resistance in the environment and of interest has been validating an ultra-trace method for 70 antibiotics and their metabolites in wastewater using the state-of-the-art SCIEX 7500 LC-MS/MS. Several other grant applications have been submitted related to AMR including a QUEX PhD Scholarship and QUEX Workshop (both led by Dr Jake O'Brien and in partnership with Professor Kevin Thomas and Exeter colleagues Professor Will Gaze, Dr Aimee Murray and Dr Anne Leonard).

Team

Theme Leaders:
Guo/Carvalho, Thomas
4 Research Fellows
7 PhD students

Key research funding

ARC Linkage (Carvalho)
*Advance Qld Industry Research Fellowship (Li)
Collaborative Research Centre (O'Brien, Thomas)
NHMRC Investigator (O'Brien)
Melbourne Water (O'Brien)

Planned Submissions

Submitted:
QUEX (O'Brien, Thomas)
UQ Foundation Research Excellence Award (O'Brien)

Advanced surveillance techniques

QAEHS Theme Leaders Profs Thomas and Mueller and Research Fellows in their teams are leading several research projects to advance global sampling and analytical capabilities to achieve improved surveillance of chemical hazards in humans and the environment.

Highlights during the reporting period include the successful development and application of passive and active samplers for chemical and biological hazards. A key focus area has been on increasing our ability to identify and monitor the complexity of the chemicals that humans are exposed to. This has progressed through both better understanding the capabilities of high-resolution mass spectrometric techniques as well as developing a bespoke platform to effectively process and identify new and emerging chemical hazards.

Professor Thomas, Dr O'Brien and Dr Kaserzon have been progressing an ARC Discovery Project aiming to develop an automated early warning social network to systematically detect newly identified emerging chemical threats. The project, due to be completed in 2023, is expected to provide the first spatial and temporal distribution of new emerging chemical health threats in Australia.

Dr Kaserzon and Professor Thomas have also been awarded ARC Linkage Project funding (supported by Queensland Health leveraging funds) to expand passive sampling approaches to emerging chemical classes of concern. The project includes the Victorian EPA, Seqwater and NIVA in Norway. Passive samplers that have been and continue to be calibrated through this project and have been successfully applied to monitoring campaigns in Australia and overseas (Spain and the Czech Republic) for detection of a range of chemicals of emerging concern including pesticides, pharmaceuticals and personal care products and illicit drugs. The samplers are helping inform levels of trace contaminants in a range of water systems in Australia. A book chapter and several research papers have been published from this work, with an additional three manuscripts in preparation.

QAEHS has provided a report to the Australian Government Department of Agriculture, Water and the Environment providing spatiotemporal trends in Australian ambient air quality over a 10-year period with a focus on trace organic pollutants.

Over the last 8 years, QAEHS has been providing catchment water quality risk assessments across 40 sites in South East Queensland to Seqwater as part of their Catchment and Drinking Water Quality Micro Pollutant Monitoring Program to ensure safe and reliable supply of the region's drinking water source reservoirs. Results from each summer / winter campaign have been made publicly available to all Australians via the Seqwater website. Data generated through this project has and continues to inform the water industry of any water quality risks and guideline exceedances. Tools applied and developed through this project have been use for multiple other sampling campaigns across Australia. This project provides a valuable and unique long-term dataset that may help understand temporal trends in pollutant exposure and monitoring in Australia waterways. The work with Seqwater has led to developments and proof of concept applications of new monitoring tools to tackle challenging water pollutants such as glyphosate, per and poly-fluorinated chemicals, tyre wear particles and UV filters. Seqwater and QAEHS continue to push the boundaries with developed technologies that address current and emerging chemicals of concern.

We are also pleased to announce that QAEHS, in partnership with the University of Tasmania and Deakin University, has recently been awarded ARC funding to establish the ARC Training Centre for Hyphenated Analytical Separation Technologies. The QAEHS node, led by Professor Thomas, Dr Rauert and Dr O'Brien, will focus on applying novel hyphenated methods to complex environmental systems and train the next generation of researchers in this space. The training centre will commence its work in 2023.

Key research funding

ARC Discovery (Thomas, Kaserzon)
*ARC Linkage (x2) (Kaserzon)
U.S. SERDP (Kaserzon)
SEQWater tender (Kaserzon)
Commonwealth Government (Mueller)
*ARC Linkage (Thai)
ARC Industrial Transformation Training Centres (Thomas, Rauert, O'Brien)
Goodman Foundation (x2) (Beggs, Clokey, Kaserzon)

*Qld Health leveraging funds

Team

Theme Leaders:
Thomas, Mueller
6 Research Fellows
10 PhD students

Planned submissions

Submitted:
ARC DECRA (Wang)

Plastics and plastic-related chemicals

The Minderoo Centre – Plastics and Human Health officially launched in March 2022. A world first, the Centre is supported by a philanthropic donation from the Minderoo Foundation that has allowed for the creation of a state-of-the-art 'clean' lab facility (with minimal plastic contaminants), completed in June 2021. Prof Kevin Thomas is the director of the new centre, which is physically located at UQ's PACE building at Woolloongabba. In partnership with the Minderoo Foundation and Neuroscience Research Australia, QAEHS researchers have been working to develop new protocols to measure plastic chemicals in human tissue, urine, and blood. In 2021-2022, the team detected PFAS and brominated flame retardants in human brain tissue and have been working to improve limits of quantification for phthalate metabolites and bisphenols. Methods have been developed to detect plastics in urine. The first of the six Minderoo-supported PhD students has been recruited and will commence their project in late 2022 investigating mother infant plastics exposure. Also, in collaboration with the Minderoo Foundation, QAEHS hosted global workshops on human biomonitoring of additives and plastics in 2021-2022.

Tyre road wear particles are one of the biggest microplastic pollution sources to the environment and the additive chemicals in tyres can leach into waterways and pose a significant risk to aquatic species. With support from the Queensland Department of Environment and Science (DES), Dr Cassandra Rauert and Professor Thomas have investigated concentrations of tyre additive chemicals and tyre road wear particles in Cairns and Brisbane waterways and have detected for the first time in Australia a toxic chemical – 6PPD-quinone – implicated in mass deaths of aquatic species in North America (the finding was reported in The Guardian on 21 March 2022). The team have applied for an ARC Discovery Project grant to further this research and evaluate the occurrence, transformation, and pathways of road-related plastics pollution in key environmental systems.

In July 2021, the Federal Government announced support for the ARC Training Centre in Bioplastics and Biocomposites, in which QAEHS is participating. The new Training Centre aims to develop industry-ready specialists to drive advances in technology for the development of bioplastic and biocomposite products.

Also, of note in 2021-2022, Professor Thomas sits on the advisory committee of the European EUROqCHARM (EUROpean quality Controlled Harmonization Assuring Reproducible Monitoring and assessment of plastic pollution) project, the goal of which is to establish harmonised methodologies for the monitoring and assessment of macro-, micro- and nanoplastics in the environment, as well as blueprints for standards and recommendations for policy and legislation.

Team

Theme Leaders:
Thomas, Mueller, Fielding

4 Research Fellows

8 PhD students

Key research funding

The Minderoo Foundation (Thomas, Mueller)
ARC Discovery (Kaserzon)
Research Council of Norway (Thomas)
QUEX (x3) (Fielding, Thomas)
EU Marie Curie Fellowship (Schacht, Thomas)
ARC Industrial Transformation Training Hub (Thomas)
UQ Research Infrastructure (Thomas)

Planned Submissions

Submitted:
ARC Laureate Fellowship (Thomas)
ARC DECRA (Okoffo)
ARC Discovery Project (Thomas, Rauert)

Climate Change and Health

In 2021-2022, Dr Dung Phung took over as theme leader for the Climate Change and Health theme from A/Prof Linda Selvey. Over the past year, Dr Phung was focusing on the aspects of heat-related health effects and adaptation intervention. He collaborated with UQ colleagues and Victoria Health to conduct a study evaluating the effectiveness of heat-health alert system in reducing the mortality/morbidity in Victoria, and this research topic has been expanded to Queensland. He also teamed up with Griffith University colleagues to conduct study in the association between heat and ambulance callouts and the digital solutions in reducing heat-related health risk among older people in Queensland. Another continuing study he has been being working with a research team at Yale Centre for Climate Change and Health to conduct review on indoor cooling solutions to reduce heat-related morbidity/mortality.

Professor Kelly Fielding has worked with her PhD student, Carla Magi-Prowse, to conduct research seeking to understand adaptive and maladaptive ways that people can cope with climate change. She has also been supervising a new Research Fellow, Dr Ans Vercammen, whose research is also focused on the theme of mental health and climate change.

Team

Theme Leaders:
Phung, Fielding

1 Research Fellow

3 PhD students

Key research funding

UK Welcome Trust Fund (Phung)
NHMRC e-ASIA (Phung)
ARC Discovery Project (Fielding)

Clandestine labs and illicit drugs

The ACIC-funded National Wastewater Drug Monitoring Program continues to progress successfully, with Reports 14-16 released by ACIC over 2021-2022. The data collected by QAEHS and collaborators at the University of South Australia provides valuable insight into trends in drug consumption across Australia and can identify new sources of threat. It is expected that the program will be extended.

In addition to the National Wastewater Drug Monitoring Program, there have been several smaller spin-off projects funded by ACIC over 2021-2022, which aim to improve understanding of substance use in Australia, including providing spatiotemporal trend information for more remote sites.

Dr Phong Thai's ARC Linkage Project funding (supported by Queensland Health leveraging funds) commenced in 2021-2022. The project aims to investigate the extent to which household residents are exposed to third hand smoke from methamphetamine use. The team have started sample collection. A future project will examine the hypothesis that inhalation is an important pathway for methamphetamine exposure in contaminated households.

Dr Richard Bade secured a 3-year ARC DECRA fellowship to develop and apply novel analytical methods for detecting new psychoactive substances in wastewater.

Key research funding

ACIC (Mueller, Thomas, Thai, O'Brien)
*ARC Linkage (Thai)
Massey University (Mueller)
ARC DECRA (Bade)
UA-DAAD (Bade, O'Brien, Dewapriya, Tscharke)

*QH leveraging funds

Planned Submissions

Submitted:
UQ Foundation Research Excellence Award (Bade)

Planned:
ARC Linkage Project (Thai)

Team

Theme Leaders:
Thomas, Mueller

6 Research Fellows

1 PhD student

Special Projects

Minderoo Centre - Plastics and Human Health

March 2022 saw the official launch of the new *Minderoo Centre – Plastics and Human Health*, a world-leading research centre dedicated to understanding more about human exposure to plastic particles and chemicals, supported with philanthropic funding from the Minderoo Foundation.

While we know that microplastics can enter the human body and are found in our gut and lungs through ingestion and inhalation, little is known about just how far the particles can penetrate our bodies and what impact they and their associated chemicals might have on our health. The research conducted by the Minderoo Centre – Plastics and Human Health will allow us to address this critical gap.

In partnership with the Minderoo Foundation and Neuroscience Research Australia, a team of QAEHS researchers led by Professors Kevin Thomas and Jochen Mueller are developing methods to accurately sample and measure plastic chemicals and particles in humans, with a particular focus on human brain tissue. The UQ-Minderoo research team expects to release their first findings by the end of 2022 and will then actively seek collaborations with other globally leading institutions working on similar missions around the world.

The Centre's cutting-edge research is made possible by access to one of the world's first plastics contamination-controlled laboratories, a brand-new facility supported through a philanthropic donation from the Minderoo Foundation and based at the Pharmacy Australia Centre of Excellence (PACE) building in Woolloongabba, Brisbane.

Laboratories are typically full of plastic, and so there is a high risk that samples will be contaminated from the external environment making it very difficult to accurately measure plastic particles present in human tissue, blood, and urine. Built almost entirely out of welded stainless steel and with extensive testing of construction materials, the Centre's laboratory is specially designed to minimise plastic and has some of the lowest plastic contamination in the world.

Dr Andrew Forrest AO, Dr Nicola Forrest, Professor Deborah Terry AO and Professor Kevin Thomas visting the Minderoo Lab.

National Wastewater Drug Monitoring Program

Wastewater analysis is widely applied internationally as a tool to measure and interpret drug use within national populations. The Australian Government has recognised the considerable benefits of wastewater analysis and the Australian Criminal Intelligence Commission has partnered with QAEHS and the University of South Australia to introduce a national program based on international models.

The National Wastewater Drug Monitoring Program monitors substances of concern across all regions of Australia. The study focuses on thirteen licit and illicit drugs, including tobacco, alcohol, methamphetamine, cocaine and MDMA (ecstasy). Trends in estimated drug consumption are being established over the three-year project.

"Partnering with the universities of Queensland and South Australia to deliver the program, the pilot was so successful that in the 2019/20 budget we increased the ACIC's annual appropriation by $1.2 million to ensure this valuable program continued."

– Honorable Karen Andrews MP, Minister for Home Affairs

Wastewater treatment plants located across capital cities and regional Australia, covering all States and Territories, have been invited to participate in this program.

The National Wastewater Drug Monitoring Program is a key initiative in establishing an objective evidence base on illicit drug use and the level of use of several legitimate substances.

Michael Phelan APM, CEO, Australian Criminal Intelligence Commission, speaking at *Testing the Waters 5 International Conference*, Brisbane, September 2021.

Australian Environmental Specimen Bank

Environmental Specimen Banks' (ESBs) store many millions of samples in unique frozen archives. Most of the samples are archived at ultra-low temperatures to ensure the chemical and biological integrity of the samples over long time periods.

The samples cover various regions of the world, and generally the samples are accessible to third parties (e.g., universities) for research.

The Australian Environmental Specimen Bank (AESB) is the first and only national biobank for the combined storage of both human and environmental samples that enable retrospective studies related to exposure assessment and environmental toxicology. The facility was established in 2009 and is located at UQ's PACE building and incorporates both -20 and -80 degrees Celsius freezer storage.

In 2021, we received funding from the Australian Research Council and Australian research and government partners to expand the storage capacity and advance the capabilities of the national repository for appropriately collected and preserved samples with associated metadata (e.g., collection, site or population information) from environmental or biomonitoring programs across Australia.

The AESB will be managed as a nationally available (to all public sector researchers), operationally self-funded resource for integrated exposure research into the future. The archive will support longitudinal and cross-sectional studies to assess trends in exposure to chemical and biological hazards in the Australian population, identify emerging hazards, and provide a scientific basis for policy and regulatory actions.

The AESB aims to be an enduring national resource that enhances Australian exposure research capabilities and enables effective management and regulation of chemical and biological hazards in Australia. Retrospective mapping of hazards from source to exposure in our communities and environment also leads to social, environmental, and economic benefits through focused and timely intervention strategies to mitigate adverse exposures.

The new purpose-built facility will be located at UQ's Long Pocket precinct in Brisbane and will be operational in early 2023.

Image: Architect's drawing of the Australian Environmental Specimen Bank (AESB).

Research Outputs

Research quality

Comparison of the research outputs (all years) of the QAEHS team with leading Australian research institutions shows that QAEHS researchers continue to rank above average in relation to quality of outputs (three key metrics are shown in figure below).

For 2021-22, QAEHS researchers were active across twenty-six subject areas.

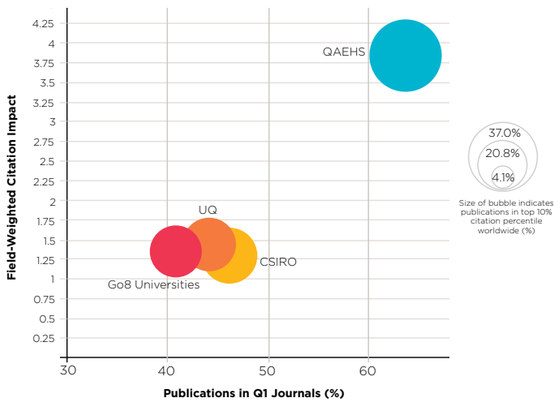
High relevance and impact of our work, demonstrated through increasing publication and citation:

- 177 publications in 2021 and 100 in 2022 to date
- 17,777 citations in 2021 and 11,335 in 2022 to date

High quality of our 2021-22 work:

- 88% of publications in Q1 journals (top 25% of journals)
- 5.7% of papers in the top 1% cited

Our research metrics compared to The University of Queensland (UQ), CSIRO and the Group of Eight Universities (Go8) are shown in the chart below. Plotted is the field weighted citation impact (a measure of the citation impact compared to global averages in the field) against the percentage of publications in the top 25% of journals. Each bubble represents the percentage of publications in the top 10% worldwide based on number of citations (see legend).



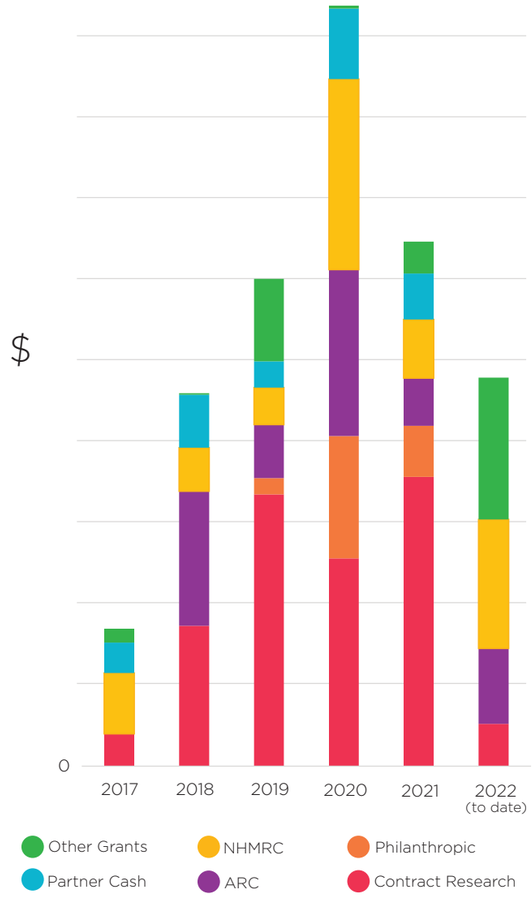
Competitive research funding

We received $14 Million in new funding in 2021-2022. This brings the total funding awarded to QAEHS for all projects to from 2016 to 2022 to $63 Million. Outcomes for several competitive grant applications submitted in 2021-2022 are pending, worth an additional $11 Million.

QAEHS researchers continue to submit a high number of applications for competitive granting schemes, participating in 46 applications with 26 of these led by QAEHS researchers. As of June 2022, 18 competitive grant applications are under preparation.

Success rates remain above national average this year at 60% for QAEHS-led applications.

Details of research grants and other funding awarded in 2021-22, as well as prior grants active during the year, are provided in Appendix A.



Funding and Recognition

Fellowships

NHMRC Investigator (2022-2027)

Dr Jake O'Brien | A National Wastewater Surveillance Program for Antimicrobial Resistance.

ARC DECRA (2022-2025)

Dr Richard Bade | Facilitating detections of new psychoactive substances in wastewater.

UQ Amplify (2022-2024)

Dr Pradeep Shukla | Advance Queensland Mid-Career Fellowship.

AXA Fellowship (2022-2024)

Dr Chang He | Discovering new biomarkers to expand our understanding of human exposure to contaminants of emerging concern.

Awards and Prizes

Dr Emma Knight | UQ Early career researcher development: knowledge exchange & Translation fund

Dr Jiaying Li | UQ HaBS Early Career Academic Research Accelerator Award

Dr Richard Bade | UQ HaBS Early Career Researcher award

Carly Beggs & Joe Clokey | 2022 Goodman Foundation Research Grants

Dr Elvis Okoffo | Best Student Presentation at the Society for Environmental Toxicology and Chemistry *What's in our Water Conference*, August 2021

A/Prof Jianhua Guo | International Water Association (IWA) Microbial Ecology and Water Engineering (MEWE) 2021 EACR award during the IWA MEWE conference, October 2021

2021 QAEHS Best HDR Student Publication Awards

The HDR Student Best Publication Awards are to encourage and reward HDR students who are the primary authors of high-quality publications. Ten HDR students submitted applications which were reviewed by a judging panel (Dr Greg Jackson, Queensland Health, Associate Professor Nicholas Osborne, QAEHS Theme Leader and Dr Ayomi Jayarathne, QAEHS Postdoctoral Research Fellow).

1st place

Francisca Riberio | *Quantitative analysis of selected plastics in high-commercial-value Australian seafood by pyrolysis gas chromatography mass spectrometry* published in Environmental Science & Technology.

2nd place

Bastian Schulze | *An assessment of quality assurance/quality control efforts in high resolution mass spectrometry non-target workflows for analysis of environmental samples* published in Trends in Analytical Chemistry.

3rd place

Rose Nguyen | *Influences of chemical properties, soil properties, and solution pH on soil-water partitioning coefficients in per- and polyfluoroalkyl substances (PFASs)* published in Environmental Science & Technology.

Elvis Okoffo | *Release of plastics to Australian land from biosolids end-use* published in Environmental Science & Technology.

Education.

Postgraduate

Our PhD Program in the FY21-22 reporting period substantially increased the number of PhD students in the program. By the end of the reporting period, we had 45 PhD students.

2021-22 saw fifteen HDR scholarships were competitively awarded through the UQ Graduate School. This year we also welcomed 1 honours and 1 Masters student to our postgraduate student cohort.

Eight PhD students have submitted or completed in 2021-22:

Dr Elvis Okoffo | A quantitative assessment of plastic residues in Australian biosolids.

Andrew Novic | Novel approaches for the monitoring and assessment of pesticide loads in flood events.

Dr Atinuke Ojo | Toxicological Assessment of per- and polyfluoroalkyl substances (PFAS) mixtures using cell-based bioassays.

Dr Fahad Ahmed | Population treated pain and gout burden in Australia through wastewater-based epidemiology.

Dr Christie Gallen | Fate of persistent toxic organic chemicals in the waste stream.

Dr Francisca Ribeiro | Assessing dietary exposure to microplastics through seafood consumption and potential accumulation of microplastics in aquatic organisms.

Dr Qiuda Zheng | Estimation of alcohol and tobacco consumption by wastewater-based epidemiology

Rory Verhagen | Exposure mapping - combining wastewater analysis with human biomonitoring.

QAEHS Scholarships

As part of the 2018-23 Alliance agreement, the UQ Graduate School were to provide a minimum of five targeted QAEHS PhD scholarships over the course of the term and six scholarships have been competitively awarded exceeding the minimum requirement.

Further details on our current HDR students, including PhD topics and QAEHS scholarship holders, are provided in Appendix B.

Summer and Winter Research Program

QAEHS participate in the University of Queensland's Summer and Winter Research Programs, run during the summer and winter university breaks, providing undergraduate students with an opportunity to gain research experience working alongside some of the university's leading academics and researchers. During the reporting year we have hosted 8 summer and winter research students. Three of those students have returned, participating in both the summer and winter program run during this reporting period.

Professional development, education and community outreach

A suite of sixteen short video presentations providing an Introduction to Wastewater Based Epidemiology were developed for Queensland Health staff to view at a time convenient to them. A 'chat' capability for collaboration between the researchers and stakeholders was also provided to allow for questions and responses.

History of WBE internationally and in Australia	An introduction to WBE and its historical development in Australia and internationally.
How to Samples series	A series of short videos showing how to sample.
Sampling uncertainties	An overview of sampling uncertainties and their importance in WBE.
In sewer stability	In-sewer stability of WBE biomarkers.
Excretion factors	The role of excretion factors for chemical biomarkers in calculating consumption.
Archiving stability	The stability of chemical biomarkers under various storage conditions.
Festivals, mining and small populations	Application of WBE in small populations.
National Wastewater Drug Monitoring Program	Overview of the Australian Criminal Intelligence Commission National Wastewater Drug Monitoring Program.
Sewersipper	An introduction to the Sewersipper sampler.
COVID Method	Methods to detect SARS-CoV-2 in wastewater.
New psychoactive substances	Detecting the use of new psychoactive substances in Australia.
SewAus wastewater program	An introduction to the SewAus wastewater program.
Surveillance of SARS-CoV-2 RNA in wastewater	Analysis of SARS-CoV-2 RNA fragments in Qld wastewaters.
Passive sampling	Understand how passive samplers help with near source tracking of COVID-19.
End user perspective – ACIC	A Federal Government agency's perspective on the utility of wastewater-based epidemiology for government.
End user perspective – COVID	A State Government agency's perspective on the utility of wastewater-based epidemiology for government.

A GIS and Public Health webinar is under development covering topics including historical perspective, examples of GIS, public information on COVID-19 hotspots, visualisation and statistical analysis, ranking of health issues in QLD in context of GIS (infectious and/or chronic diseases).

QAEHS-affiliated Queensland Health 'buddies' were invited participate in QAEHS Scientific Planning Committee meetings.

Research workshops and other events organised, contributed to and/or hosted by QAEHS researchers in 2021-22 included:

- Australian Criminal Intelligence Commission workshop and presentation, Brisbane, March 2022.
- Seqwater Workshop, Training and Lab Tour, Brisbane, November 2021
- NeuRA lab visit and Minderoo workshop, Brisbane, March 2022

Masters of Environmental Health Sciences

The Masters of Environmental Health Sciences (MEHSc), under the directorship of QAEHS Theme Leader A/Prof Nicholas Osborne, commenced in first semester 2019 with three award options – Masters, Graduate Certificate and Graduate Diploma in Environmental Health Sciences.

The MEHSc program aims to prepare mid-career professionals and future leaders to more effectively manage complex environmental health challengesmanage complex environmental health challenges more effectively. It aims to build on the demonstrated strengths of multidisciplinary teams and perspectives for addressing complex challenges, preparing graduates for roles and responsibilities including, for example, providing information and advice based on science, formulating or contributing to the development of policy, regulations and guidelines, and identifying hazards and assessing and managing risks to human health and safety, and approaches to communicating the risks and mitigation options for stakeholders.

Our Theme Leaders and team members are teaching four of the MEHSc courses.

- Risk Communication (Core), Semester 2, 2021 - A/Prof Kelly Fielding
- Chemical Hazards (Core), Semester 2, 2021 - Prof Kevin Thomas
- Biological Hazards (Core), Semester 1, 2022 - Dr Gilda Carvalho
- Pharmacokinetics, Pharmacodynamics and Toxicology (elective), Semester 1, 2022, Dr Pradeep Shukla

3 students graduated in 2021-22

33 Students enrolled

9 Graduate Dipolma

24 Masters

67% are international students

Ranked number 2 in Australia for public health (Global Ranking of Academic Subjects 2021) and number 19 in the world for environmental sciences (QS World University Rankings 2022).

Communication.

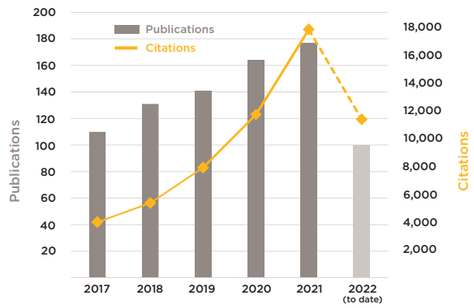
Our communication approach focuses on translation, delivery, and targeted dissemination of the centre's outputs. Importantly, the Centre aims to ensure effective delivery of our current research findings and initiatives to the expectation of our stakeholders to inform government policy development and industry innovation.

QAEHS' reputation and established presence are evident as awareness and engagement locally, nationally, and globally continues to grow. This is reflected in the continued increase in utilisation of our outputs (research reach), seminar series and event attendance, media reach and website visitors.

Research reach

QAEHS research outcomes are primarily communicated to the wider scientific community, government, and the public via peer reviewed publication in top ranking journals. Both publications and citations for the combined QAEHS research team across all themes have increased each year since 2017 and are on track to see a further increase in 2022.

QAEHS' work is highly collaborative and has international significance and reach. In 2021-22 QAEHS' work was published in collaboration with over 170 different institutions in Australia and overseas; and has been cited in 121 countries.



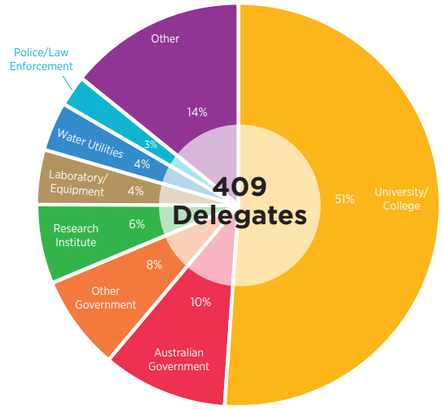
Conferences

COVID-19 travel restrictions continued to impact in person attendance at conferences, and attendance and dissemination of research outcomes were mostly limited to virtual events this year. QAEHS staff and students have presented at eighteen inter/national conferences throughout 2021-22.

Testing the Waters 5 International Conference

Co-hosted by QAEHS, the University of South Australia and the Australian Criminal Intelligence Commission, was held at Customs House in Brisbane in September 2021. The conference was a dynamic hybrid event that allowed speakers and attendees to attend in person or virtually. World leaders in wastewater-based epidemiology and industry and government stakeholders presented keynotes on topics including end user perspective, long-term monitoring and spatial trends, and government policy evaluation and influencing.

A total of 409 conference registrations consisting of 61 registered as in-person attendance and 348 as virtual delegates. Attendees spanned 35 countries representing Universities and research institutes, Australian and international government, law enforcement, water utilities and laboratory equipment suppliers.



International *Testing the Waters 5* conference delegates

Queensland Mass Spectrometry Symposium

QAEHS will co-host the 2022 Queensland Mass Spectrometry Symposium with UQ's School of Pharmacy on 1-2 December 2022.

Website

New content, updates and continuous improvement to the website has seen engagement grow with a 15% increase in page views to 52,556, up from 44,684 in the previous reporting period.

The 'Home' and 'Our People' pages are consistently the most viewed. The Testing the Waters conference, PhD Positions and Professor Kevin Thomas pages were regularly in the top 3 visited pages over the reporting period.

The Testing the Waters 5 conference attracted significant new users to the website with a clear spike in page views in the month leading up to the conference. The page dedicated to the conference program was also viewed extensively with a total of 1,141 unique views from August to October 2021.

Visitors from 145 countries engaged with the website between July 2021 and June 2022 and our audience consists of approximately half of visitors these from Australia. The USA and China, second and third respectively, and make up 20% of the other half of visitors from outside of Australia.

Seminar Series

The QAEHS weekly Seminar Series continues to be valued in 2021-22 reaching wider audiences through our online streaming platform. Virtual and in-person stakeholder engagement is encouraged through a Q&A session at the conclusion of presentations. This mode of research dissemination provides a great opportunity to engage with Queensland Health staff and members of industry and the scientific community interested in our research. Every seminar is advertised on the website and available upon request.

In 2021-22, twenty-eight external, internal, and visiting researchers and students presented their recent research findings, including:

Assistant Professor Denise Mitrano, ETH Zurich – "*Small(er) plastics, big(ger) problems? Fate, transport and implications of nano- and microplastics in the environment*".

Dr Susi Vardy, Queensland Department of Environment and Science – "*The Queensland Ambient PFAS Program – spatial and temporal variation of PFAS*".

Professor Beate Escher, Helmholtz Centre for Environmental Research – "*In vitro bioassays for detecting the human exposome*".

Dr Lubertus Bijlsma, University Jaume I – "*The role of high-resolution mass spectrometry in environmental research: Developments and challenges*".

Community Outreach

Presenting to local high school students

QAEHS researcher, Dr Cassie Rauert presented microplastics to a school assembly of year 7-12 students at the Queensland Academy of Science Mathematics and Technology.

Milbi Festival

QAEHS researchers, Dr Nathan Charlton, Elvis Okoffo, Stacey O'Brien and Tania Toapanta, were invited to speak at the Milbi Festival in Bundaberg, explaining how microplastics can harm marine life.

The Milbi Festival celebrated the region's iconic turtle encounters, connecting to salt water and freshwater country and encompassing the broader and complimentary themes of environmental care, connection to the Southern Great Barrier Reef, water catchments and local storytelling, making the festival unique to the region.

Events

The Annual QAEHS Research Forum was held via webinar on 30 November 2021. QAEHS Theme Leaders presented an overview of the work being undertaken in their theme and recent findings to an internal and external audience, including Queensland Health staff and members of the AMC.

Media

National and international awareness of QAEHS continues to grow through media coverage this year and the centre has again achieved significant media coverage. Measured media coverage was secured across print, radio, TV and online outlets at local, national and international levels. Media mentions increased (up 60% from the 2020-21 reporting year), with a total of 244 mentions and a potential reach of 225 million people.

All media articles are published on the QAEHS website.

World Science Festival

Our Microplastics team were invited back to the Queensland Museum's World Science Festival in 2021. Unfortunately, due to flooding, the event was moved to an online platform, and we were not able to take part.

APPENDICES

Appendix A - Research Funding

New Funding in 2021–22

Years	Funding Source	CIs	Project
2022	UQ HABS - EAIT Early Career Researcher seed grant	Jiaying Li	Network-wide modelling for illicit drugs and pharmaceuticals in sewer systems
2022	UQ HABS - EAIT Early Career Researcher seed grant	Jiaying Li	Green disinfection to combat antibiotic resistance
2022-2025	ARC DECRA	R. Bade	Facilitating detections of new psychoactive substances in wastewater
2022-2026	NHMRC Investigator	J. O'Brien	A National Wastewater Surveillance Program for Antimicrobial Resistance
2022-2024	ARC Linkage	P. Thai, X. Wang, C. He, T. Prow, P. Culshaw, C. Wilkins	Understanding third hand exposure of Australian people to methamphetamine
2021-2024	Queensland Correctional Services	P. Thai, J. Mueller, K. Thomas, J. O'Brien, R. Verhagen	Drug testing consumables and confirmatory services including wastewater analysis
2021-2022	UQ Research Infrastructure Investment Scheme	P. Halley, A. Whittaker, B. Laycock, K. Thomas, D. Martin, C. Chan	Characterisation Facility for Polymers in the Environment (CFPE) - understanding polymer degradation and property changes to reduce plastics waste and develop new circular plastics
2021-2023	Fundação para a Ciência e a Tecnologia (FCT), Portugal	A. Banks, J. Mueller, X. Wang	4FirHealth – Firefighting occupational exposure and early effects on the health of operational forces
2022-2025	ARC Discovery	P. Thai, B. Tscharke, J. O'Brien	Realistic assessment of biomarker transformation in the wastewater systems
2022-2026	ARC Discovery	S. Bengtson Nash, X. Wang	Uncovering Antarctica's Secret Chemical Voyagers for Expedited Regulation
2022-2024	EU Horizon 2020 Marie-Curie Fellowship	V. Schacht, K. Thomas	Fate and impact of past, present and future consumer plastic on soil
2022-2023	Universities Australia: Australia-Germany Joint Research Cooperation Scheme	R. Bade, J. O'Brien, B. Tscharke, P. Dewapriya	Assessing the toxicity and metabolism of New Psychoactive Substances and their presence in wastewater
2022-2023	AXA Fellowship	C. He	Discovering new biomarkers to expand our understanding of human exposure to contaminants of emerging concern
2022-2024	UQ Amplify	P. Shukla	Advance Queensland Mid-Career Fellowship
2022-2027	EU Horizon	P. Bohlin-Nizzetto (NILU), K. Thomas, J. Mueller, X. Wang	INQUIRE: Identification of chemical and biological determinants, their sources, and strategies to promote healthier homes in Europe
2022-2025	ARC Linkage	S. Kaserzon, J. Mueller	Reducing glyphosate exposure from high use practices
2022	ARC Linkage Infrastructure, Equipment and Facilities (LIEF)	J. Mueller	A cyclic ion-mobility mass spectrometer for resolving molecular isomers
2022	UQ ECR Knowledge Exchange & Translation Grant	E. Knight	The leachability of per- and poly-fluoroakyl substances (PFASS) and their precursors from compostable food contact materials (FCMS) into food
2022	Goodman Foundation Research Grants 2022	J. Clokey, C. Beggs	Evaluating the presence of pesticides in Moreton Bay/Quandamooka's seagrass after a La Niña summer

Years	Funding Source	CIs	Project
2022	Goodman Foundation Research Grants 2022	J. Clokey, C. Beggs	Understanding exposure and risk from widespread use of neonicotinoids in the Moreton Bay Catchment
2022	Royal Society of New Zealand via Massey University	J. Mueller	Dark side of the Net: Exploring and modelling the impact of online illegal drug markets
2022	Melbourne Water	J. O'Brien, K. Thomas, Jinglong. Li	Preliminary investigations relating to the role of cyanobacterial blooms in the amplification and dispersal of antimicrobial resistance
2021-2022	Arcadis	P. Thai	Evaluation of PFAS release from impacted concrete
2021-2023	Advance Queensland WRAP	S. Ghorbani Gorji	Maternity funding
2021-2022	Australian Criminal Intelligence Commission	J. Mueller	Drug surveillance using passive sampling
2021-2023	Queensland Health	K. Thomas	Queensland Alliance for Environmental Health Sciences

Active funding 2021–22

Years	Funding Source	CIs	Project
2022-2026	NHMRC 2020 Special Initiative in Human Health and Environmental Change	S. Vardoulakis, N. Osborne, plus 50 CIs	Healthy Environments and Live (HEAL)
2022-2025	NHMRC Ideas	N. Osborne, R. Fuller, S. Reid, G. Griffith, P. Dennis, D. Darssan, R. Richards	New eDNA measures of greenspace biodiversity and its linkage chronic disease
2022-2024	UQ Research Support Package	F. Zare, N. Ghasemi, P. Shaw, N. Ba nsal, N. Osborne, Q. Li, K. Thomas, M. Veidt, A. Abbosh, A Rakic	Minimising Human Health Risks from Antibiotic Resistant Bacteria in Wastewater Using a Novel Pulsed Power Technology
2021-2023	The Minderoo Foundation	K. Thomas, J. Mueller, C. Shepherd	Developing protocols to measure plastic chemicals in human brain, blood and urine
2021-2022	Commonwealth Department of Agriculture, Water and the Environment	J. Mueller, X. Wang, C. He	Ambient air analysis services
2021-2022	UQ Research Support Package	K. Thomas	Strategic growth of the Queensland Alliance for Environmental Health Sciences (QAEHS)
2021-2022	Australian Criminal Intelligence Commission	J. Mueller	Wastewater analysis services
2021	Commonwealth Department of Agriculture, Water and the Environment	J. Mueller, E. Knight, B. Tscharke	Wastewater analysis services
2021	ARC Linkage Infrastructure, Equipment and Facilities	J. Mueller	Australian Environmental Specimen Bank: advancing specimen bank capability
2020-2021	Central Highlands Regional Council	K. Fielding	Promoting Water Conservation in the Central Highlands Region
2020-2021	Norfolk Island Health and Residential Aged Care Service	J. Braeunig, J. Mueller	PFAS Exposure Study for current and former Norfolk Island Fire Service firefighters
2020-2022	Queensland Health	K. Thomas & J. Mueller	Wastewater – COVID-19
2020-2030	The Minderoo Foundation	K. Thomas & J. Mueller	Minderoo Centre – Plastics and Human Health
2020-2022	Health and Wellbeing Queensland	L. McDaid, M. Robinson, A. Mamun, C. Salmon	Health and Wellbeing Queensland (HWQLD) and ISSR partnership project
2020-2022	MRFF Indigenous Health Research Grant	Y. Fatima, A. Mamun, T. Skinner, R. Bucks, S. Blunden, S. Yiallourou, S. Smith, L. McDaid	Co-designed sleep health program to achieve better sleep and improved mental health symptoms in Indigenous adolescents
2020-2027	ARC Centre of Excellence	J. Baxter, D. Ribar, N. Glozier, B. Gleeson, K. Thorpe, D. Cross, D. Cobb-Clark, G. Kalb, S. Smith, M. Sanders, C. Parsell, H. Christian, A. Mamun, A. Tymula, Z. Huang, R. Coley, O. Doyle, E. Grundy, H. Hoffmann, J. Schipperijn	ARC Centre of Excellence for Children and Families over the Life Course
2020-2025	Seqwater	S. Kaserzon, J. Thompson, J. Mueller	Micro-pollutant and passive sampler monitoring program
2020-2024	NHMRC Targeted Call for Research	J. Mueller, M. Kirk, L. Fritschi, J. Bräunig, L. Toms, K. Fielding, M.P. Kay, L. Aylward & others	Assessing effectiveness of PFAS exposure control in exposed communities and fire fighters
2020-2024	ARC Linkage Project	J. Mueller, J. O'Brien, B. Tscharke, J. Gerber, R. Bade, P. Thai, S. Kaserzon, C. Gartner, G. Carvalho, N. Crosbie, M. McLachlan, A. Covaci, C. Ort, S. Samanipour, P. Leahy, R. van Egmond, P. Maxwell, R. Mann, P. Sherman, M. Williams, A. Zamyadi	Understanding Australia by analysing wastewater during the Census 2021
2020-2024	ARC Australian Laureate Fellowships	J. Mueller	Transforming our understanding of the chemical exposome
2020-2024	NHMRC Targeted Call for Research	L-M. Toms, J. Bräunig, K. Thomas, O. Cheneval	Human biomonitoring of PFAS: assessing reliability and validity
2020-2023	NHMRC Targeted Research	X. Wang, P. Thai, C. He, T. Prow	Human exposure to PFAS and their precursors in the human environment and their biotransformation processes
2020-2023	ARC Linkage Project	S. Kaserzon, K. Thomas, D. Hawker, C. Veal, M. Bartkow, A. Hinwood, J. Cumming, J. & I. Allan	Improved monitoring of aquatic pollutants in national water resources
2020-2023	ARC Linkage Project	A. Oehmen, L. Ye, G. Carvalho, R. Lemaire, M. Stokholm-Bjerregaard, D. Gale, M. Hordern, M. Albuquerque	Sustainable water reuse and resource recovery through cost-effective BNR
2020-2023	NHMRC Partnership Project	A. Mamun, P. Sly, Y. Fatima, L. Calloway, K. Thomas, F. Boyle	Exposure to Trihalomethanes in pregnancy and birth outcomes in Queensland: integrated data analysis and case studies for better policy and health outcomes

Years	Funding Source	CIs	Project
2020-2023	NHMRC Targeted Call for Research	K. Thomas, J. Martin, S. Kaserzon, S. Samanipour & K. Morphett	Comprehensive characterisation of the PFAS exposome
2020-2023	NHMRC Targeted Call for Research	X. Wang, P.T hai, C. He & T. Prow	Human exposure to PFAS and their precursors in the human environment and their biotransformation processes
2020-2023	Commonwealth Department of Agriculture, Water and the Environment	J. Mueller	Specimen banking services
2020-2023	Strategic Environmental Research Development Program	S. Kaserzon, J. Mueller, D. Hawker & C. Higgins	Development of passive sampling methodologies for per- and polyfluoroalkyl substances
2020-2023	EU Horizon 2020 Marie-Curie Fellowship	N. Rousis & K. Thomas	NTS-EXPOSURE: The innovative wastewater-based epidemiology approach with the advances of high resolution mass
2020-2022	ARC Discovery Project	B. Laycock, P. Lant, P. Dennis, S. Pratt, S. Kaserzon & M. MacLeod	Bioplastics in the environment: lifetimes and toxicology
2019-2024	NHMRC-EU Collaborative	J. Mueller & A. Ponsonby	Novel testing strategies for endocrine in the context of developmental neurotoxicity
2019-2023	Australian Criminal Intelligence Commission	J. Mueller, B. Tscharke, J. O'Brien, K. Thomas, C. Gerber, J. White & R. Bade	National Wastewater Drug Monitoring Program
2019-2023	EU Horizon 2020	J. Ruegg, A. Forsby, D. Mucs, U. Norinder, B. Platsak, A. Bergman, P. Leonards, J. Mueller, K.Thomas, & others	Novel Testing Strategies for Endocrine Disruptors in the Context of Developmental Neuro Toxicity (ENDpoiNTS)
2019-2022	Advance Queensland Industry Research Fellowships	P.Shukla	A technology for PFAS remediation from contaminated surface and ground water
2019-2022	Norwegian Institute for Water Research	K. Thomas	Microplastics: Long-term Effects of plastics and Additive Chemicals on marine organisms (MicroLEACH)
2019-2022	National Natural Science Council (China)	W. Tang, J. Ng, P. Teasdale, and others	Mechanism of sediment oxygen consuming process and its influence on the heavy metal release and bioavailability in black and malodorous water bodies
2019-2021	ARC Linkage Project	K. Thomas, C. Gartner, J. Gerber, P. Thai, B. Tscharke, J. O'Brien, K. Steadman	Estimating use of tobacco and nicotine products through wastewater analysis
2019-2021	Philanthropic donor	C. Peng & J. Ng	Investigation of the cellular responses to environmental hazards and their regulations
2019-2021	NHMRC-NAFOSTED Joint Call for Collaborative Research Projects Grants	P. Sly, A. Pham, S. Ranganathan, H. Le, P. Thai, D. Phung, R. Ware, D. Tran & others	Wearing masks to reduce traffic-related air pollution exposure and improve children's respiratory health
2019-2022	ARC Discovery Project	K. Thomas, S. Kaserzon, B. Kasprzyk-Hordern, E. Schymanski, S. Samanipour	A global platform for identifying emerging chemical threats
2019-2022	ARC Discovery Project	G. Jiang, J. O'Brien, L. Coin & S. Luby	Revolutionizing real-time genomic epidemiology in urban wastewater systems (ARC Discovery Project administered by the University of Wollongong)

Years	Funding Source	CIs	Project
2019-2022	ARC Discovery Project	K. Thomas, S. Kaserzon, B. Kasprzyk-Hordern, E. Schymanski, S. Samanipour	A global platform for identifying emerging chemical threats
2018-2021	NHMRC Project Grant	C. Lodge, J. Mueller, S. Dharmage, M. Abramson, A. Lowe, B. Erbas	Perinatal exposure to household and environmental toxins and the risk of asthma and allergic disease up to 25 years (NHMRC Project Grant led by the University of Melbourne)
2018-2021	ARC Special Research Initiative – PFAS Remediation	I. Pikaar, W. Clarke, P. Jensen, J. Bräunig, W. Verstraete, J. Torero Cullen	Efficient PFAS removal from urban wastewater using a novel two-step approach
2018-2021	ARC Special Research Initiative – PFAS Remediation	J. Mueller, M. McLaughlin, J. Bräunig, R. Kookana, D. Toase, A. Nolan, C. Barnes, J. Thompson & others	Remediation of PFAS contaminated soil using a soil washing treatment train
2018-2021	ARC Discovery Project	J. Mueller, K.V. Thomas, L. Toms & P. Hobson	Exposure mapping - combining wastewater analysis with human biomonitoring
2017-2021	NHMRC Project Grant	C. Gartner, M. Boyd, B. Bonevski, C. Gilks, R. Courtney, L. Cobiac, H. McRobbie, P. Baker, J. Mueller	A Pragmatic Randomised Clinical Trial of Nicotine Vaporisers added to Smoking Cessation Treatment for Priority Populations Living with Comorbidities

Appendix B - QAEHS Staff and Students

Academic staff

Staff Member	FTE
Abdullah Mamun	0.2
Ayomi Jayarathne	1
Ben Tscharke	1
Cassandra Rauert	1
Chang He	1
Cheng Peng	1
Dung Phung	0.2
Elvis Okoffo	1
Emma Knight	1
Fisher Wang	1
Gilda Carvalho	0.1
Jack Ng	0.2
Jake O'Brien	1
Jianhua Guo	0.1
Jiaying Li	1
Jochen Mueller	1
Justin Cormick	1
Kelly Fielding	0.2
Kevin Thomas	1
Linda Selvey	0.2
Nicholas Osborne	0.2
Phong Thai	1
Pradeep Dewapriya	1
Pradeep Shukla	1
Richard Bade	1
Sara Ghorbani Gorji	1
Sarit Kaserzon	1

Professional staff

Staff Member	Appointment
Chris Paxman	Senior Research Technician
Christina Carswell	Senior Research Technician
Daniel Barry	Senior Research Technician (from January 2021)
Gabriele Elisei	Senior Research Technician
Geoff Eaglesham	Senior Analytical Chemist
Henry Simila	Workplace Health and Safety Coordinator and Laboratory Manager
Homa Teimouri	Senior Research Technician
Jasper Bowman	Senior Research Technician (from October 2021)
Julia Lin	Senior Research Technician
John Fagerholm	Project Officer (from November 2021)
Josh Tynan	Senior Research Technician (to December 2021)
Lauren Gubbin	Centre Manager
Melissa Brinums	Research Manager – Operations
Michael Gallen	Analytical Chemist
Nathan Charlton	Research Assistant
Olivier Cheneval	Scientific Research Team Leader (to June 2022)
Pritesh Prasad	Analytical Research Technician
Ryan Shiels	Senior Research Technician
Stephanie Hall	Executive Assistant
Summer Xia	Senior Research Technician
Tim Reeks	Analytical Chemist
Xuan Qu	Senior Research Technician (from January 2022)
Yan Li	Senior Research Technician

Honorary and adjunct staff

Staff Member	Affiliation	Appointment
Amy Heffernan	Eurofins	Honorary
Andreas Sjödin	Centers for Disease Control and Prevention	Honorary
Andrew Banks	Queensland Racing Integrity Commission	Adjunct
Beate Escher	Eberhard Karls University Tubingen	Honorary
Christine Baduel	Instit de Recherche pour le Developpement	Honorary
Christine Hof	WWF Australia	Adjunct
Christopher Higgins	Colorado School of Mines	Honorary
Clive Paige	Queensland Health	Adjunct
Daniel Drage	University of Birmingham	Honorary
Daniel Francis	Queensland Health	Adjunct
Darryl Hawker	Griffith University (Emeritus)	Honorary
Foon Yin Lai	Swedish University of Agricultural Sciences	Honorary
Greg Jackson	Queensland Health	Adjunct
Janet Cumming	Queensland Health	Adjunct
Jeremy Prichard	University of Tasmania	Honorary
John Corfield	Brisbane Airport Corporation	Adjunct
John Piispanen	Queensland Health	Adjunct
Karl Bowles	RPS	Adjunct
Leisa-Maree Toms	QUT	Honorary
Leisbeth Weijs	Griffith University	Honorary
Lesa Aylward	Summit Toxicology	Honorary
Linda Birnbaum	National Institute of Environmental Health Sciences	Honorary
Maria Jose Gomez Ramos	Universidad de Almeria	Honorary

Staff Member	Affiliation	Appointment
Matthew Taylor	NSW Department of Primary Industries Fisheries	Honorary
Michael Bartkow	Seqwater	Adjunct
Munro Mortimer	Prior - Queensland Department of Environment and Resource Management (DERM)	Adjunct
Peter Hobson	Sullivan Nicolaides Pathology	Adjunct
Peter Vallely	Australian Criminal Intelligence Commission	Adjunct
Phil Choi	Queensland Health	Adjunct
Rizalyn Albarracin	Queensland Health	Adjunct
Saer Samanipour	University of Amsterdam	Honorary
Siobhan Rigby	Department of Environment and Science	Honorary
Sophie Dwyer	Prior - Queensland Health	Adjunct
Suzanne Huxley	Queensland Health	Adjunct
Tatiana Komarova	Queensland Health Forensic and Scientific Services	Honorary
Walter Vetter	University of Hohenheim	Honorary
Warish Ahmed	CSIRO	Honorary

Students – Higher Degrees by Research submitted or completed in 2021–2022

Student	Advisory Team	Topic	Degree
Andrew Novic	Jochen Mueller, Sarit Kaserzon, External	Novel approaches for the monitoring and assessment of pesticide loads in flood events	PhD
Atinuke Ojo	Jack Ng, Cheng Peng	Toxicological Assessment of per- and polyfluoroalkyl substances (PFAS) mixtures using cell-based bioassays	PhD
Elvis Okoffo *	Kevin Thomas, Jake O'Brien, Ben Tscharke, Jochen Mueller	A quantitative assessment of plastic residues in Australian biosolids	PhD
Fahad Ahmed	Kevin Thomas, Jake O'Brien, Ben Tscharke, Jochen Mueller	Population treated pain and gout burden in Australia through wastewater-based epidemiology	PhD
Christie Gallen	Jochen Mueller, External	Fate of persistent toxic organic chemicals in the waste stream	PhD
Francisca Ribeiro	Kevin Thomas, Jake O'Brien, Sarit Kaserzon, Jochen Mueller	Assessing dietary exposure to microplastics through seafood consumption and potential accumulation of microplastics in aquatic organisms	PhD
Qiuda Zheng	Phong Thai, Kevin Thomas, Jochen Mueller, Ben Tscharke, Jake O'Brien	Estimation of alcohol and tobacco consumption by wastewater-based epidemiology	PhD
Rory Verhagen	Kevin Thomas, Jochen Mueller, Ben Tscharke, Sarit Kaserzon	Exposure mapping - combining wastewater analysis with human biomonitoring	PhD

* QAEHS Scholarship holders

Students – Higher Degrees by Research withdrawn or transferred in 2021–2022

Student	Advisory Team	Topic	Degree
Maryam Imran *	Jack Ng, Cheng Peng	Bioaccessibility, interaction effects and risk assessment of mixed metals	PhD
Ruby Yeh	Kevin Thomas, Cassie Rauert, Kelly Fielding	Investigating the effectiveness of personalised feedback using passive sampler, silicone wristband, as a tool in communicating environmental risks	PhD

Students – Higher Degrees by Research continuing in 2021–2022

Student	Advisory Team	Topic	Degree
Anh Kim Dang	Phong Thai, Abdullah Mamun	Substance abuse and risky behaviours among industrial workers in Vietnam	PhD
Bastian Schulze	Sarit Kaserzon, Jochen Mueller, Kevin Thomas	Improvements towards real comprehensiveness of non-target analysis	PhD
Belinda Moore	Jochen Mueller, Kevin Thomas, Sarit Kaserzon, External	An exploration of contaminants of emerging concern (CECs) in QLD wastewater	PhD
Carla Alongi	Jochen Mueller, Emma Knight	Investigating the fate of Neonicotinoids in soil and runoff	PhD
Carla Magi-Prowse *	Kelly Fielding, External	Exploring the antecedents and consequences of ecoanxiety	PhD
Carly Beggs	Sarit Kaserzon, Kevin Thomas	Developing strategies to tackle pollution from per- and poly-fluorinated chemicals (PFAS) in the environment	PhD
Chantal Keane	Jochen Mueller, Jiaying Li	Characterisation of CECs: top-down and bottom-up approaches to a waste convergence story	Masters
Cheng Tang	Fisher Wang, Jochen Mueller	Human exposure to trace organic contaminants in the environment and their biotransformation process	PhD
Coral Jeffries	Kevin Thomas, Cassie Rauert	Assessing dietary exposure to plastics and associated chemicals	PhD
Eryn Wright *	Simon Reid, Russell Richards	Understanding the dynamics of non-occupational Australian bat lyssavirus exposures in Queensland	PhD
Garth Campbell	Sarit Kaserzon, Kevin Thomas	Reducing exposure from high use practices	PhD
Grechel Taucare	Jochen Mueller, Ben Tscharke	Data mining for characterisation of the chemical exposome in Australia	PhD
Hong Le	Phong Thai, External	Wearing masks to reduce exposure to traffic-related air pollution and improve respiratory health in children	PhD
Jinglong Li	Kevin Thomas, Jake O'Brien	Antibiotics and other chemicals that select for resistance in the environment	PhD
Jingyu Liu	Jack Ng	Bioaccessibility, interaction effects and risk assessment of mixed metals	PhD
Joseph Clokey	Sarit Kaserzon, Kevin Thomas, Jochen Mueller	Improved monitoring of aquatic pollutants in national water resources	PhD
Katja Shimko	Kevin Thomas, Jochen Mueller, Ben Tscharke, Jake O'Brien, External	Wastewater analysis for the detection of World Anti-Doping Agency (WADA) prohibited substances	PhD
Kavitha Karanam	Pradeep Shukla, Kevin Thomas, External	Microplastics in water system: Issues and treatment	PhD
KM Shahunja *	Abdullah Mamun, Peter Sly	The role of family environments to the development of respiratory and cardiovascular health: an intergenerational perspective	PhD
Kristie Thompson *	Jochen Mueller, Kevin Thomas, External	Investigation of novel PFAS and other emerging contaminants of concern and their precursors using non-targeted analytical methods	PhD
Leah Clarke	Kevin Thomas, Jake O'Brien, Jianhua Guo, External	Characterisation of novel substances in wastewater that select for antimicrobial resistance	PhD
Lily Weir	Jochen Mueller, Sarit Kaserzon, External	Understanding the efficiency of regulating chemicals for controlling environmental and human exposure	PhD
Mathieu Feraud	Kevin Thomas, Jake O'Brien, Sarit Kaserzon	Comprehensive characterisation of human PFAS exposure using nontarget analysis	PhD
Michelle Engelsman	Jochen Mueller, Fisher Wang, External	Firefighter exposure risks and subsequent reproductive effects	PhD
Md Nazrul Islam	Jack Ng, Cheng Peng	Effects and health risk assessment of mixed metals at and near a ship wrecking yard in Bangladesh	PhD
Rachel Mackie	Kevin Thomas, Jochen Mueller	Combining wastewater analysis with human biomonitoring to map chemical exposure	PhD

Student	Advisory Team	Topic	Degree
Samuel Namonyo *	Gilda Carvalho, Jianhua Guo, Karen Weynberg	The potential of phage therapy against biofilms of pseudomonas aeruginosa originating from urban water systems	PhD
Sandra Nilsson	Jochen Mueller, Jennifer Bräunig	Investigating half-lives of per- and poly-fluoroalkyl substances (PFASs) in humans	PhD
Shuo Chen *	Jochen Mueller, Phong Thai, Chang He	Biotransformation and bioaccumulation potential of CPs in humans	PhD
Stacey O'Brien	Kevin Thomas, Jake O'Brien, Fisher Wang, Cassie Rauert, External	Microplastics in air	PhD
Stephen Burrows	Kevin Thomas, Sarit Kaserzon, External	Exploring the nanoscale surface interactions of microplastics in natural waters	PhD
Tania Toapanta	Sarit Kaserzon, Kevin Thomas	Development of accurate quantitative methods for microplastics in the terrestrial and marine environments	PhD
Thi Minh Hong (Rose) Nguyen	Jochen Mueller, Jennifer Bräunig, External	Fate and transport of per- and polyfluoroalkyl substances (PFASs) in the soil environment	PhD
Youngjoon Jeon	Kevin Thomas, Jake O'Brien, Sarit Kaserzon	Applying chemical space concept to improve non-target analysis	PhD
Zhe Wang	Kevin Thomas, Phong Thai	Estimating use of tobacco and nicotine products through wastewater analysis	PhD
Zubaria Ishaq	Fisher Wang, Jochen Mueller, Phong Thai	Human exposure pathways for per- and polyfluoroalkyl substances (PFAS)	PhD

* QAEHS Scholarship holders

Appendix C - Major Partners and Collaborators

Kevin Thomas

- Em Prof Sarah Dunlop and Dr Christos Symeonides Minderoo Foundation • Flourishing Oceans
- Prof Tamara Galloway OBE, Prof Will Gaze and Dr Aimee Murray, University of Exeter
- Prof Jonathan Martin, Stockholm University
- Dr Stephanie Wright, Imperial College London
- Naomi Speers, Sports Integrity Australia
- Dr Catrin Goebel, Australian Sports Drug Testing Laboratory
- Prof Barbara Kasprzyk-Hordern, University of Bath
- Dr Emma Schymanski, University of Luxembourg
- Dr Saer Samanipour, University of Amsterdam
- Prof Erica Donner, University of South Australia
- Dr Elisabeth Rødland and Prof Bert van Bavel, Norwegian Institute for Water Research
- Prof Brett Paull, University of Tasmania

Jochen Mueller

- Shane Neilson, Australian Criminal Intelligence Commission
- Dr Warish Ahmed, CSIRO
- Dr Michael Bartkow, SE Qld Water
- Craig Barnes, Airservices Australia
- Dr Nick Crosbie, Melbourne Water
- Prof Jason White, Dr Cobus Gerber, University of South Australia
- Prof Chris Higgins, Colorado School of Mines
- Prof Michael McLachlan, University of Stockholm

Kelly Fielding

- Dr Kylie Morphett, UQ
- Dr Angela Dean, UQ
- Dr Robyn Gulliver, UQ
- Professor Winnifred Louis, UQ
- Professor Matthew Hornsey, UQ
- Prof Anne Roiko, Griffith University
- Prof Jonathan Rhodes, UQ
- Prof Sarah Bekessy, RMIT
- Dr Dan Lunney, University of Sydney
- Dr Md Sayed Iftekhar, Griffith University
- Tweed Shire Council
- NSW Biodiversity Conservation Trust
- Seqwater
- Healthy Land and Water

Jianhua Guo

- Queensland Urban Utilities
- South Australia Water
- Melbourne Water
- Seqwater
- BGI, Australia
- Profs Scott Bell, and Rachel Thomson at Faculty of Medicine at UQ
- Prof Will Gaze, University of Exeter
- Dr Erica Donner, University of South Australia

Nicholas Osborne

- University of New South Wales (Population Health and Climate Change Research Centre)
- Australian Defence Force
- Bureau of Meteorology
- The George Institute
- Indian Institute of Technology
- Sydney Water
- Universities of Exeter and Plymouth

Dung Phung

- Professor Yuming Guo, Monash University
- Professor Robert Dubrow, Yale University
- Professor Cordia Chu, Griffith University
- A/Prof Shannon Rutherford, Griffith University
- Professor Nam Vu, National Institute for Hygiene and Epidemiology
- Dr Dang Tran, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam

Jack Ng

- Prof Yan Zheng – SUSTech, Shenzhen, China
- Prof Wenzhong Tang – RCEES, Beijing, China
- Prof Virginia Ciminelli – UFM, Brazil
- Prof Norhasnida Zawawi – Universiti Putra Malaysia
- Prof Tetsuya Suzuki – Shizuoka University, Japan
- Dr David Rubinos – SMI ICE, Chile
- Prof Mary Fletcher – QAAFI, UQ
- A/Prof Barry Noller – SMI, UQ
- Prof Megharaj Mallavarpu – Uni of Newcastle
- Dr Tatiana Komarova – QHFSS

Abdullah Mamun

- Queensland Water Unit (Metro North HHS)
- Public Health Unit (Metro North HHS)
- Wide Bay Water and Waste Services
- Mount Isa Water Board

Appendix D - Community and Professional Activities

Kevin Thomas

- 2020 – present: Editorial Board Member for Environmental Science & Technology Letters
- 2020 – 2023: Steering Group member EU Horizon 2020 project, Harmonization Assuring Reproducible Monitoring and Assessment of Plastic Pollution (EUROqCHARM)
- 2019 – present: Member of Core Science Group, Global Panel on the Chemical Pollution of the Environment (gpcpe.org/)
- 2013 – present: Associate Editor for Science of the Total Environment
- 2021-2022: Guest Editor for Water Research
- 2022-2023: Guest Editor for Environmental Sciences: Advances
- 2022-: Member of the Boggo Road Collaboration Leadership Group

Jochen Mueller

- 2006 – present: Adjunct Prof, School of Public Health, Griffith University
- 2012 – present: Member of SETAC (ASE joined SETAC in 2011)
- 2009 – present: Member of Australian Water Authority
- 2003 – present: NATA Assessor
- 2003 – present: Technical Expert, International Accreditation New Zealand

Jack Ng

- 2019 – present: Editor-in-Chief, Journal of Toxicology (Stepping down as soon as a new Editor-in-Chief is appointed)
- 2018 – present: Associate Editor/Editorial Board of Critical Reviews in Environmental Science and Technology
- 2018 – present: International Advisor of Dundee Precious Metals, Canada /Namibia
- 2017 – present: Associate Editor for Frontiers in Environmental Science
- 2010 – present: Member of the International Society for Groundwater Sustainable Development
- 2010 – present: International Advisor of Kinross Gold Mine, Canada /Brazil
- 2009 – present: Editor for Journal of Toxicology
- 2006 – present: Member and Fellow of ACTRA
- 2005 – present: Member of ISTEB
- 2004 – present: Diplomat of the American Board of Toxicology
- 2004 – present: Coordinating Editor for Journal of Geochemistry and Environmental Health
- 1977 – present: RACI Charter Chemist

Kelly Fielding

- Director of Research, School of Communication and Arts, UQ
- Member of the UQ Mental Health in Climate Change Transdisciplinary Research Network
- Member of the Queensland Advisory Board of the Climate Change Communication Hub (Monash University)
- Member of the Social Research advisory committee of Healthy Land and Water
- Member of the Seqwater social advisory group
- Member of the Editorial Board of Journal of Environmental Psychology

Jianhua Guo

- Jianhua was nominated as an affiliate associate professor at IMB
- Jianhua has been selected as the Chair of 10th IWA Conference on Microbial Ecology and Water Engineering (MEWE) in 2023, Brisbane, Australia.
- 2021, Guest Editor of Water Research to organise a special issue
- 2021 – present: Editor of Journal of Hazardous Materials
- 2020 – present: Associate Editor of Water Research
- 2019 – present: Edit of Water Science & Technology
- 2019 – present: Deputy Director – Research, AWMC UQ
- Member of International Society of Microbial Ecology (ISME).
- Member of International Water Association (IWA)
- Member of Australian Water Association

Gilda Carvalho

- 2018 – present: Executive Board Member for Advanced Water Management Centre (AWMC).
- 2018 – present: Member of the International Development Group, Faculty of Engineering, Architecture and Information Technology, UQ.
- 2018 – present: Member of the Teaching & Learning Committee, School of Chemical Engineering, UQ.
- Member of International Water Association (IWA).
- Member of the Australia Water Association.
- Member of the Australasian Association for Engineering Education

Nicholas Osborne

- 2018 – present: Editorial Board member of International Journal of Environmental Research and Public Health
- 2017 – present: Editorial Board member of International Journal of Epidemiology
- 2017 – present: Editorial Board member of Pediatric Allergy, Immunology and Pulmonology
- 2015 – present: Honorary University of Exeter
- 2011 – present: Associate Editor of Archives of Environmental and Occupational Health

Abdullah Mamun

- Attended World Health Organization's (WHO) new area of work on the life course (Beyond the Decade of healthy Ageing Extending benefits across the life course) that was launched with the kick-off meeting on 9 and 10 June 2002.
- Present: Editorial board member: Birth (WILEY Publisher), Nutrients (MDPI Publisher) and Obesity Research and Clinical Practice (ELSEVIER Publisher)
- 2015 – present: NHMRC Grant Review Panel Member
- 2012 – present: Senior Scientist, International Centre for Diarrheal Disease Research Centre, Bangladesh, Dhaka, Bangladesh
- Present: Professional Society membership:
  - Global Burden of Disease Network
  - Public Health Association of Australia
  - Australasian Epidemiology Association
  - National Heart Foundation
  - National Heart Foundation Think Tank Member
  - Clinical Epidemiology and Research Synthesis methods Special Interest Group
  - ARACY-Australian Research Alliance for Children and Youth
  - Life-course Research Network
  - Maternal and Child Health Network
  - EAGLE (The EArly Genetics and Lifecourse Epidemiology Consortium)

Appendix E - Awards and honours

Kevin Thomas

- Invited speaker at Environmental Science Meeting for Australian Research Teams (ENVISmart) September 2022
- Invited speaker at Sunshine Coast Health Institute Symposium 2022 September 2022
- Invited keynote speaker at the Royal Australian Chemical Institute National Congress 2022, Brisbane, July 2022
- Invited to attend American Chemical Council Expert Microplastic Reference Material Workshop, Atlanta USA, May 2022

Jochen Mueller

- Invited Tony Roach Memorial plenary lecturer, SETAC Melbourne conference, September 2021
- Invited plenary presenter at the Queensland Mass Spec Symposium, November 2021
- Invited to be a Fellow of the Queensland Academy of Arts and Sciences

Jianhua Guo

- Awarded IWA Microbial Ecology and Water Engineering (MEWE) Early Career Researcher Award, 2021.
- Paper titled "Nonnutritive sweeteners can promote the dissemination of antibiotic resistance through conjugative gene transfer" has won the ISME Journal 2021 Best Paper award. The work is led by A/Prof Jianhua Guo

Abdullah Mamun

- Postdoctoral Research Fellow Yaqoot Fatima received the Queensland 2021 Tall Poppy Science Award.on

Appendix F - Research Publications

Book Chapters

Akyol, Ç., Ozbayram, E.G., Eusebi, A.L., Foglia, A., Cipolletta, G., Frison, N., Conca, V., Da Ros, C., Wessels, C., Ganigué, R. and Pikaar, I., 2022. Upscaled and validated technologies for the production of bio-based materials from wastewater.

Gulliver, R., Wibisono, S., Fielding, K.S. and Louis, W.R., 2021. The Psychology of Effective Activism. Cambridge University Press.

Hawker, D.W., Clokey, J., Gorji, S.G., Verhagen, R. and Kaserzon, S.L., 2022. Monitoring techniques–Grab and passive sampling. In Emerging Freshwater Pollutants (pp. 25-48). Elsevier.

Ostermeyer, P., Capson-Tojo, G., Hülsen, T., Carvalho, G., Oehmen, A., Rabaey, K. and Pikaar, I., 2022. Resource recovery from municipal wastewater: what and how much is there?.

Peer Reviewed Journal Articles

Ahmed, F., Li, J., O'Brien, J.W., Tscharke, B.J., Samanipour, S., Thai, P.K., Yuan, Z., Mueller, J.F. and Thomas, K.V., 2021. In-sewer stability of selected analgesics and their metabolites. Water Research, 204, p.117647.

Ahmed, F., Tscharke, B., O'Brien, J.W., Thompson, J., Zheng, Q., Mueller, J.F. and Thomas, K.V., 2021. Quantification of selected analgesics and their metabolites in influent wastewater by liquid chromatography tandem mass spectrometry. Talanta, 234, p.122627.

Ahmed, W., Bivins, A., Simpson, S.L., Bertsch, P.M., Ehret, J., Hosegood, I., Metcalfe, S.S., Smith, W.J., Thomas, K.V., Tynan, J. and Mueller, J.F., 2022. Wastewater surveillance demonstrates high predictive value for COVID-19 infection on board repatriation flights to Australia. Environment International, 158, p.106938.

Ahmed, W., Bivins, A., Smith, W.J., Metcalfe, S., Stephens, M., Jennison, A.V., Moore, F.A., Bourke, J., Schlebusch, S., McMahon, J. and Hewitson, G., 2022. Detection of the Omicron (B. 1.1. 529) variant of SARS-CoV-2 in aircraft wastewater. Science of The Total Environment, 820, p.153171.

Ahmed, W., Simpson, S.L., Bertsch, P.M., Bibby, K., Bivins, A., Blackall, L.L., Bofill-Mas, S., Bosch, A., Brandão, J., Choi, P.M. and Ciesielski, M., 2022. Minimizing errors in RT-PCR detection and quantification of SARS-CoV-2 RNA for wastewater surveillance. Science of the Total Environment, 805, p.149877.

Ahmed, Y., Zhong, J., Wang, Z., Wang, L., Yuan, Z. and Guo, J., 2022. Simultaneous Removal of Antibiotic Resistant Bacteria, Antibiotic Resistance Genes, and Micropollutants by FeS2@ GO-Based Heterogeneous Photo-Fenton Process. Environmental Science & Technology.

Ahmed, Y., Zhong, J., Yuan, Z. and Guo, J., 2022. Roles of reactive oxygen species in antibiotic resistant bacteria inactivation and micropollutant degradation in Fenton and photo-Fenton processes. Journal of Hazardous Materials, 430, p.128408.

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Allen, S.F., Ellis, F., Mitchell, C., Wang, X., Boogert, N.J., Lin, C.Y., Clokey, J., Thomas, K.V. and Blount, J.D., 2021. Phthalate diversity in eggs and associations with oxidative stress in the European herring gull (Larus argentatus). Marine Pollution Bulletin, 169, p.112564.

Almeida, J.R., Fradinho, J.C., Carvalho, G., Oehmen, A. and Reis, M.A., 2022. Dynamics of Microbial Communities in Phototrophic Polyhydroxyalkanoate Accumulating Cultures. Microorganisms, 10(2), p.351.

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Bade, R., White, J.M., Ghetia, M., Adiraju, S., Adhikari, S., Bijlsma, L., Boogaerts, T., Burgard, D.A., Castiglioni, S., Celma, A. and Chappell, A., 2021. A taste for new psychoactive substances: wastewater analysis study of 10 countries. Environmental Science & Technology Letters, 9(1), pp.57-63.

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Biswas, T., Thomas, H.J., Scott, J.G., Munir, K., Baxter, J., Huda, M.M., Renzaho, A., Cross, D., Ahmed, H.U., Mahumud, R.A. and Mamun, A.A., 2022. Variation in the prevalence of different forms of bullying victimisation among adolescents and their associations with family, peer and school connectedness: a population-based study in 40 lower and middle income to high-income countries (LMIC-HICs). Journal of Child & Adolescent Trauma, pp.1-11.

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Contact Details:

Professor Kevin Thomas

+61 7 3443 2444

kevin.thomas@uq.edu.au

https://qaehs.centre.uq.edu.au/

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