

PROFESSIONAL PROFILE: Dr Simon Foster

I have over 17 years of experience in the environmental and analytical teaching and consulting fields with a proven successful track record in delivering environmental management outcomes for local and federal government agencies and industry. I have lead and been involved in projects with Newcrest Mining, Newmont Mining, Queanbeyan City Council, New South Wales EPA, ACT Government, Federal Government through the National Capital Authority, MyHealthTest, Joe White Malting, NZ Department of Industry, Hemp Foods Australia, Heron Resources, CSIRO, Eurobodalla Shire Council, National Measurement Institute (NMI) as well as internationally with organisations such as the World Health Organisation (WHO), National Research Council of Canada (NRCC), International Atomic Energy Agency (IAEA) and projects with the Chinese Academy of Sciences (CAS) on mine site impacts to community and environmental health in Guizhou Province, China.

I am a globally recognised expert in the measurement and biogeochemistry of arsenic, selenium, mercury, and antimony in aquatic and terrestrial environments. I have an excellent understanding of the Australian New Zealand Water Quality Guidelines and have developed and delivered courses on developing water quality monitoring plans, statistical analysis of water quality data, development of trigger values and evaluation of the effectiveness of monitoring. Over the last 17 years I have developed and delivered water quality monitoring plans, analysis of water quality samples, sampling and preservation of samples. I have consulted widely on sampling techniques and sample handling procedures.

I have authored over 70 peer reviewed papers, 4 book chapters as well as numerous reports on the distribution, mobility, metabolism and environmental fate of toxic elements and nutrients. I hold degrees in geology, ecology and chemistry and am a chartered chemist with the Royal Australian Chemistry Society, a member of the Australian and New Zealand Environmental Institute, Member of the International Union of Pure and Applied Chemistry and an Adjunct Associate Professor at the University of Canberra.

KEY SKILLS

- Excellent communication skills
- Univariate and multivariate statistical methods
- Contaminated land sampling and assessment
- Critical thinker
- Analytical measurement
- Ecotoxicology
- Water quality
- Problem solving
- MS Office
- High level understanding of analytical sciences
- Environmental Impact Studies/Assessment
- Toxic elements (As, Se, Sb, Hg)
- Trace elemental speciation
- ICPMS, HPLC, GC-MS, FIA, LC-MS
- Biomonitoring
- Field studies / remote monitoring

QUALIFICATIONS

- Doctor of Philosophy (Applied Science) in biogeochemistry of toxic elements in the environment.
- Bachelor of Applied Science (Honours 1st class) the effects of morphology on the biogeochemical processes in open and closed estuaries.
- Bachelor of Applied Science (Regolith Sciences) majoring in Geographical Imaging Systems and Remote Sensing, Water Chemistry, Soils and Regolith
- Diploma of Applied Science (Ecology) majoring in chemistry and mine site remediation.
- Certificate in Environmental Sampling
- Chartered Chemist Royal Society of Chemistry Australia (MRACI CChem)
- Senior First Aid and CPR
- Member of International Union of Pure and Applied Chemistry
- Environment Institute Australia and New Zealand (EIANZ)
- Various Chemical Safety, Compressed gasses, Cryogenic gasses, Disability, Workplace Health and Safety, Bullying and Harassment, Remote 4WD, Remote Working, Environmental Sampling short courses completed in the line of work.

SCOPE OF RECENT WORK ACTIVITIES

- **University of Canberra** (2004 – 2021) – Associate Professor of Environmental Chemistry, Analytical Chemistry, Environmental Sciences.
 - o **Research/consultancy:** In this role I was responsible for a program of research that entailed supervising Honours, Masters, PhD students and Postdoctoral Fellows. I was also responsible for liaising with instrument manufacturers, government departments, NGO's and industry stakeholders, coordinating various specialisations that worked into the research programs. I was required to manage laboratory staff, manage the OH&S requirements in my laboratory, maintain budgets, report to various funding bodies, write and obtain grant funding for projects and manage the day to day operation of the field and laboratory equipment and staff. I was responsible for ensuring the staff were trained in the various sampling and laboratory tasks that were required and maintaining a high level of QAQC to ensure data generated were fit for purpose. I am also on the board of the Journal Separations, an international peer reviewed journal and review for numerous journals.
 - o **Teaching:** In my teaching role I was responsible for developing and delivering courses on general chemistry, analytical chemistry, marine ecology and environmental chemistry as well as teaching undergraduate units on water science, environmental monitoring and methods, environmental toxicology, forensic chemistry and drug analysis.
 - o **Administrative duties:** Tasks have included being Head of Environmental Sciences, Faculty member of Academic Board, tasked with the design of new degree programs in Environmental Health, redesigning the degree of Environmental Science as well as the chemical safety officer for my laboratory, university wide consultant on managing restricted and hazardous chemicals, chaired the universities chemical safety management committee and supported our compliance with the new GSH labelling scheme.

- Prior to 2002 I was Head Chef of the Park Hyatt Canberra managing 14 chefs and a \$3.5M food budget, Sous Chef at Alfred's in London, Head Chef of the Republic Restaurant Canberra, Chef de partie of The Room at the Halcyon Hotel London, among other appointments in London and the UK.

PROFESSIONAL AFFILIATIONS

- Member International Union Pure and Applied Chemistry (IUPAC) – since 2021
- Royal Australian Chemical Institute - Chartered Chemist – since 2004
- Member of the Environment Institute Australia and New Zealand (EIANZ) – since 2020
- Board Member of the Journal Separations – since 2019
- Reviewer for: Environmental Chemistry (CSIRO), Talanta (Elsevier), Journal of Atomic Absorption Spectroscopy (RSC), BioMetals (Springer), Journal of Environmental Monitoring (RSC), Analyst (RSC), Biological Trace Element Research (Springer), Journal of Organometallic Chemistry (Springer), Chemosphere (Elsevier), River Research and Applications (Wiley), Archives of Environmental Contamination and Toxicology (Springer), Metallomics (RSC), Marine and Freshwater Research (CSIRO), Applied Geochemistry (Elsevier), Environmental Toxicology and Chemistry (Wiley).

SELECTED ROLES / PROJECTS

- **Heron Resources** – In collaboration with the environmental officers and managing director of Heron Resources Woodlawn mine I worked on developing protocols for use of composite material sourced from Veolia waste treatment facility in remediating the tailings holdings. This work involved both experimental plots at the University of Canberra glasshouse facilities using material from the mine site as well as test plots on the tailings dam that were in the process of being decommissioned. This work aimed to establish what species of plants could be used for phytoremediation and stabilisation of the tailings.
- **Lihir Gold Mine**, Lihir, Papua New Guinea (Newcrest Mining) – coordinated the assessment of the environmental impact of mining on the near shore environment, provided oversight of the chemical testing, ensured quality control and assurance of the sampling program and laboratory testing programs, liaised with the relevant stakeholders, reporting of the findings in consultation with the company.
- **Newmont Minahasa Raya** (contacted by CSIRO) – I was tasked with analyses of fish samples from Buyat Bay, North Sulawesi Province of Indonesia to assess whether submarine tailings placement (STP) had resulted in elevated levels of arsenic/mercury in the local fish or algal populations. The program has continued for several years to monitor the stability of the submarine tailings and any potential pollution of the bay.
- **Hillgrove Mine (New England)** – Following the finding of elevated levels of antimony in milk from dairy cows we conducted investigations into the biogeochemistry and spatial extent of antimony and arsenic in the major catchment of Hillgrove mine from the mine site to the coastal estuary. We found that while antimony was elevated above background levels throughout the catchment in sediments there was little bioaccumulation in food chains. Much of the antimony entering the food supply was mainly due to ingestion of soil together with grass with some antimony crossing the gut and getting into the milk supply.

- **ACT Government** Urban Ponds project – this project looked at the capacity of urban retention ponds to capture and bind nitrogen and phosphorous from the catchment and retain them in the urban pond to reduce the amount of nutrients entering the Murry Darling Basin system from the ACT. My role was to design the sampling program to account for event-based sampling as well as routine sampling. Determine the locations for 12 automated sampling devices, work with engineers to ensure the sampling devices didn't alter the sample composition and provide representative samples from the sites. The results of the study showed that these urban ponds were net sinks of nutrients but needed careful maintenance to continue to function as designed.
- **ACT Government** Lake Tuggeranong eutrophication project – this project was to establish the drivers of blue-green algal blooms in Lake Tuggeranong which reduce its amenity to the general public. My role was to design a sampling program that covered the lake, stormwater inflows covering an area that comprised one quarter of the population in Canberra, lake sediment as well as design experiments to establish flux rates of nutrients from the lakes sediments into the overlying waters using core incubation experiments. I was also tasked with designing mesocosm experiments for insitu trials of various physical and chemical methods to mitigate blue-green algal blooms in the lake. We found that the internal loading of phosphorus in the lake, its small volume and the large volume of inflow caused conditions that lead to the release of phosphorus from the sediments in overlying waters. PhosLoc (a lanthanite manufactured clay product) proved to be efficient at mitigating the release of phosphorus for short periods and the overall conclusion was the expense and uncertainty didn't justify the application of PhosLoc at this stage. The ACT government is currently trialing ecological floating wetlands to reduce the inflows of nutrients from the catchments.
- **Queanbeyan Council** Sewage Treatment Plant Renewal Project – as part of a large team I was involved in determining site assessment criteria for the new sewage plant and any constraints that may exist on the sites chosen. I developed the sampling and analysis program for the current plant and future plant to establish the outputs and inputs to the plant for the scoping study for the design of the new plant. Developed the continuous monitoring program and sourced the equipment, installation parameters, monitoring frequency.
- **Eurobodalla Shire Council** – Coastal Lake Environmental Study. I worked as part of a team supporting a multi-disciplinary study of two coastal lagoons on the south coast of NSW. The project focused on landscape processes and catchment discharges into coastal lakes, nutrient benthic flux assessments, water quality, and sedimentary biogeochemical assessment (i.e. denitrification). My role was in support of field-based measurements, benthic dome sampling (to measure the dissolved gasses in coming from the sediments) on SCUBA, and basic water quality measurements, installation and maintenance of automated water samplers.
- **Federal Government of Australian, National Capital Authority** – Produced a report that analysed 20 years' worth of water quality monitoring data, developed trigger values for the Lake Burley Griffin and established what parameters were providing valuable data. This fed into the development of a new water quality monitoring plan for Lake Burley Griffin which I delivered as a co-author. This not only saved money and time on measuring water quality parameters that didn't contribute to the overall goals of the program, but it also simplified the sampling program overall.

- **New Zealand Department of Industry** – As part of a large team including the University of Auckland, University of Technology Auckland, Cornell University (US), Enviroflight (US), and Callahan Industries (NZ) I am responsible for developing way to mitigate arsenic in end use products derived from seaweed. These products are aimed at the aquaculture, poultry, and agricultural markets and cannot contain high levels of arsenic which is present in nearly all seaweed in various forms. This project was given \$8M NZD by the Department of Industry is an ongoing forecast to conclude in 2025.
- **Hemp Foods Australia** – I was responsible for developing a project to investigate the use of industrial hemp in the remediation of legacy mine sites. Using Hempfoods Australia seed stock of different species of hemp we discovered species of hemp that could be grown in contaminated sediments with high levels of zinc, taking up large amounts from the soil allowing for the potential for phytoremediation or potentially phytomining. Hemp not only allowed for the reduction in metal concentration in the upper layers of soil but could be used to contribute large amounts of organic material to soils depleted of organic hummus from the mining process. The project has also shown that a commercial crop could potentially be grown as an interim crop on land in the process of being remediated for environmental uses reducing the cost of mine site remediation.
- **Joe White Malting** – I worked on assessing the toxicological properties of new selenium enriched malting products from the malting process through to the final brewed beer product.
- **MyHealthTest** – I lead a team of scientists to produce commercial pathology tests for MHT. The project was awarded \$8M in funding from the Federal Government and delivered over a 2 year period. This project was delivered on time and within budget. As well as develop and validate the assays and provide the documentation for NATA and TGA approval we developed training courses for their staff and educational material for medical practitioners about the validity of the tests and interpretation of the results.
- **ACT Government** Urban stormwater lakes water quality monitoring program (2002 - 2004). I was Program Leader for in situ water quality measurements and sampling. I was also involved in the data analysis, interpretation, and reporting to the ACT government.
- **Other Projects:**
 - Lake Macquarie NSW – selenium flux from sediments. This project estimated the outgassing of volatile selenium from Lake Macquarie that entered the lake through leaching of fly ash from the power stations on the shores of the lake. This project was carried out over a 10 year period by various honours and PhD students. At the conclusion of the project we estimated that through natural methylation and outgassing of selenium from the sediment the rehabilitation of Lake Macquarie would take approximately 20 years.
 - Biomonitoring: Use of oysters/cockles/freshwater mussels as biomonitors of metal pollution. We have conducted many studies on the use of sessile species to act as biomonitors of pollution in near shore and riverine environments.
 - Laboratory analysis: I have provided laboratory analysis services, training and method development services to Geosciences Australia, National Measurement Institute, Research Council Canada, World Health Organisation, University of NSW, University of Wollongong, Federation University, CSIRO, University of Queensland,

Great Barrier Marine Park Authority, University of Adelaide, University of Graz (Austria), University of Aberdeen (UK), University of Crete (Greece), International Atomic Energy Authority, Harvard University among others. As well as analytical services provided, organisations such as the WHO have adopted methods I have developed for the measurement of arsenic species in rice under Codex Alimentarius Commission arsenic in rice paper adopted globally.

TRAINING & DEVELOPMENT:

- Perkin Elmer – developed and delivered short courses on the analysis of trace and ultra trace elemental analysis by ICPMS, chemical species in environmental samples by HPLC-ICPMS, GC-ICPMS and IC-ICPMS.
- Developed and delivered short courses on the ANZWQG for developing sampling and analysis programs, development of relevant trigger values, sample collection, sample handling, selection of sampling containers, analysis of data, statistical analysis of results, reporting of results and evaluation of monitoring programs.
- Developed short courses on establishing QA/QC processes to ensure validity of data from sampling and analysis programs, laboratory operations, sample handling and Chain of Custody.
- Developed education material for the Eurobodalla Shire Council to educate the local population on the function of small ICOLLS (estuaries that open and close periodically) to mitigate the locals digging out the berms to inundate the estuaries in order to reduce the odour from the ICOLL.
- I have supervised 14 honours students, 2 Masters students and 14 PhD student projects.

REFEREES

	Dr Daniel Spooner	Professor Tariq Ezaz	Dr Stuart Simpson
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